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Bibliography on Cooling Power and Its Measurement, p. 1622

Vol. 6 November 1955 No. 11

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

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SUBSCRIPTION RATE: $8.00 per year to members and non members. Single and back issues $2.00. Back volumes, $10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. A. F. 19 (604)-302.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 6 NOVEMBER, 1955 No. 11

AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY

SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Cooling Power and Its Measurement

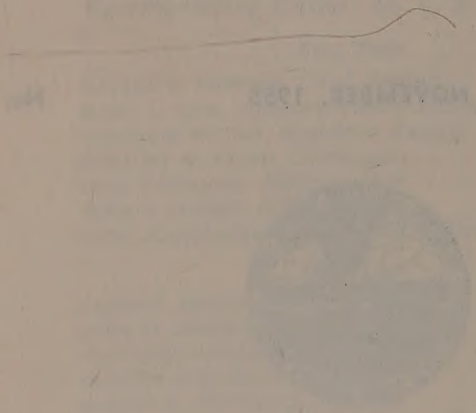
by
Isadore L. Dordick

Prepared for
U. S. Army Quartermaster Research and Development Center
Environmental Protection Branch

(For complete table of contents see back cover)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.



FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references on a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Bibliographies published this year are:

1. **Bibliography of Bibliographies on Meteorology,** Vol. 6, No. 1, Jan. 1955
2. **Textbooks and Monographs Containing Subject Bibliographies,** Vol. 6, No. 2, Feb. 1955
3. **Storm Surges,** Vol. 6, No. 3, March 1955
4. **Ionospheric Propagation,** Vol. 6, No. 4, April 1955
5. **Photochemistry of Upper Atmosphere,** Vol 6, No. 5, May 1955
6. **Cloud Physics,** Vol. 6, No. 6, June 1955
7. **Radar Cloud Physics,** Vol. 6, No. 7, July 1955
8. **Atmospheric Nuclei (1841–1950),** Vol. 6, No. 8, Aug. 1955
9. **Atmospheric Nuclei (1951–1955),** Vol. 6, No. 9, Sept. 1955
10. **Weather Modification,** Vol. 6, No. 10, Oct. 1955
11. **Cooling Power and its Measurement,** Vol. 6, No. 11, Nov. 1955

Forthcoming bibliography will be:

1. **Synoptic Meteorology of the Arctic,** Vol. 7, No. 1, Jan. 1956

Other bibliographies in preparation are:

Actinometers	*Night Airglow*
Arctic Synoptic Meteorology	*Ocean-Atmosphere Energy Exchange*
Climate of the Arctic	*Ozone*
Cosmic Rays in the Atmosphere	*Singularities*
Fog Forecasting	*Snow Cover*
Indoor Climatology	*Synoptic Aerology*
Microwave Propagation	*Tropical Cyclones*

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue cumulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where t material may be found. The Union List of Serials (Gregory) is the source of most of t symbols used. In some cases, where no symbol has been assigned to a library, one will devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by char

Geographic locations are in the English form rather than the form used locally, for examp Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherw stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to t Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numb (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (V 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEORLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

See also: **Symposium on Oceanographic Instrumentation** (U. S. Off. of Nav. Res.), 6.11–57.

6.11–1 551.515.2(08)

†UNESCO Symposium on Typhoons, Tokyo, Nov. 9–12, 1954, **Proceedings.** Pub. by he Japanese National Commission for UNESCO with the cooperation of the organizing ommittee for the Unesco Symposium on Typhoons, **1955.** 257 p. figs., photos,, tables, efs., eqs. **DWB**—The project for a regional symposium on typhoons was organized by JNESCO Science Cooperation Office for Southeast Asia in Shanghai in 1951 and furthered y the Manila Branch in 1954. The symposium, held in Tokyo on Nov. 9 to 12, 1954, was ttended by 45 delegates and others, including experts on typhoons and hurricanes from all ver the world (14 countries). The publication consists of 5 papers on prevention of disaster y typhoons, 9 papers on typhoon structure, 7 papers on formation and development and 7 n movement of typhoons (a total of 28 papers) together with a list of participants by countries Burma, China, India, Pakistan, Japan, Indonesia, Korea, Macao, Hong Kong, U.S.A., Vietnam, Thailand, Philippines and Ryukyu), the program, resolutions regarding a WMO nformation bureau on coordination of world-wide research on tropical cyclones sponsored y UNESCO and on a more adequate radiosonde, radar, wind and nephoscope observation etwork. The separate papers have been abstracted individually and the contents of the olume listed in *MAB*, July 1955, p. 1058. English abstracts of 25 papers are found in the *Meteorological Society of Japan, Journal*, Ser. 2, 32(11/12):354–358, **1954.** Other reviews: Peterson, A. D., **Typhoons.** *Science*, 121(3135):122–123, Jan. 28, **1955** and **"Proceedings f the Unesco Symposium on Typhoons" held at Tokyo from 9 to 12 November 1954.** *UNESCO, Monthly Bulletin*, Oct. **1955.** p. 4. *Subject Headings:* **1. Typhoon symposia 2. Typhoon research.**—*M.R.*

6.11–2 551.511:532(08)

†Midwestern Conference on Fluid Mechanics, 1st, Univ. of Illinois, May 12–13, 1950, **Proceedings.** Ann Arbor, Michigan, J. W. Edwards, **1951.** 398 p. numerous figs., tables (some fold.), eqs., bibliogs. **DWB**—A collection of 31 papers by various experts on aero-dynamical, astro-physical, chemical engineering, hydraulics and mechanical engineering aspects of fluid dynamics and turbulence. The papers were read at the First Midwestern Conference of Fluid Dynamics in May 1950 at Urbana, Ill. About 350 attended. The opening addresses were given by HUGH DRYDEN of NACA on Turbulence and by R. J. SEEGER of Naval Ordnance Laboratory on Aerophysics Research. Several papers were abstracted separately. Also: Midwestern Conference on Fluid Mechanics, 3d, Univ. of Minnesota, March 23–25, 1953, **Proceedings.** Pub. by the Univ., June **1953.** 783 p. numerous figs., tables, refs. and eqs. **DWB**—In Pt. I, 6 surveys of various aspects of turbulent transfer of heat and particles are presented. In Pt. II, 36 papers on all aspects of nonviscid and quasi-inviscid flow, turbulence, experimental methods, boundary layers, temperature and combustion effects are presented. Several of these papers have been abstracted separately. This conference is a sequel to two earlier conferences. *Subject Headings:* **1. Fluid mechanics symposia 2. Collected works 3. Turbulence. I. Platzman, G. W. II. Dryden, H. L. III. Seeger, R. J. IV. Fultz, D.**—*M.R.*

6.11–3 91(08

†James, Preston Everett and Jones, Clarence F. (*eds.*), **American geography: invento and prospect.** John K. Wright, consulting editor. Maps by John C. Sherman. Publish for the Association of American Geographers by Syracuse University Press, **1954.** 590 33 figs. (incl. photos), bibliog. at end of each chapter. **DWB**—In this compendium devot to the history and present status of American geography are 26 articles by outstanding Ame can geographers emphasizing regional aspects in particular, but many other aspects incidentall Historical, population, settlement, urban, political, economic, agricultural, mineral, man facturing, geomorphology, soils, plant, animal, medical military, cartographic and aeri photographic geography. The articles of particular interest to meteorologists are tho by John Leighly on climatology, Peveril Meigs on hydrology, Burke and Elliott on ocea ography and D. H. K. Lee on physiological climatology. These are abstracted separatel *Subject Headings:* **1. Regional geography 2. Compendium of geography 3. American g ography. I. Wright, John K.** (*ed.*) **II. Sherman, John C. III. Leighly, John IV. Meig Peveril V. Lee, D. H. K.**—*M.R.*

6.11–4 551.578.4:551.501(49

*Davos, Switzerland. Eidgenössisches Institut für Schnee- und Lawinenforschun **Schnee und Lawinen im Winter 1951/52.** [Snow and avalanches in winter, 1951/52.] I *Winterberichte*, No. 16, **1953.** 103 p. 38 figs., 39 tables. On cover-title: **Schnee und Lawin in den Schweizeralpen Winter, 1951/52. DWB, MH-BH**—Pt. A, Zingg, T. H., **Meteorolog** contains a description of the weather for each month from Oct. 1951–Sept. 1952, and t annual variations of the various meteorological factors. Tables give the daily values of t individual weather variables for the above period. Pt. B, In der Gand, H. R., **Snow a avalanches in the Parsen region,** presents an account of (1) the snow cover developme duration of the snow cover, snow depths, etc.; and of characteristics of the avalanches of whi a chronological list is given; a map shows the distribution of the avalanches. Pt. C, Schild, M **Snow and avalanches in the remaining area of the Swiss Alps,** contains a description of t avalanche observations network, a list of the stations (shown also on a map), data on sno depths, water equivalent of snow, water equivalent and weight of the daily fresh snow, a total snow amount and snow depth for individual months and development of the snow cov at various localities. Also a list of avalanche bulletins is included. Pt. D, Schild, M **Accidents and damages caused by avalanches,** lists for each avalanche the destruction cause In Pt. E, Figlister, R., **The snow pressure problem,** the author examines various formul for determining snow pressure exerted by a creeping snow cover attached to the underlyi soil upon an infinitely long wall perpendicular to the slope, snow pressures exerted by a creepi but gliding snow cover upon a similar wall and the pressure exerted upon a wall of finite leng by a creeping and gliding snow cover. Also the results of snow pressure measurements a given. Pt. F, Roch, André, **The glacier, the snow and avalanche of Mt. Everest,** is a descriptio of these phenomena based upon the author's experience as a member of the Swiss Evere Expedition of 1952. Pt. G is a brief account of various meteorological, hydrological, cry tallographic studies on snow and of mechanical investigations dealing with avalanche pr tection carried out during the winter 1951/52. *Subject Headings:* **1. Snow research statio 2. Observational data 3. Avalanches 4. Snow cover 5. Snow pressure. I. Zingg, T II. In der Gand, H. R. III. Schild, M. IV. Figlister, R. V. Roch, André.**—*I.L.D.*

TEXTBOOKS

See also: **History of weather science** (Arakawa), 6.11–55.

6.11–5 551.58(0

*†Alisov, B. P.; Berling, A. and Mikhel, V. M., **Kurs klimatologii, Chast' 3, Klimaty zemnog shara.** [Course in climatology, Pt. 3, Climates of the earth.] *Leningrad, Gidromet. Izdat* **1954.** 320 p. figs. 163–232; charts 7–16 (fold. laid in), tables 163–281. 90 refs. Collatio (except paging) continues from Pts. 1–2. **DWB**—The major influences in the climate of th U.S.S.R. are discussed in detail in the first section of Ch. XII (Climate of the U.S.S.R.

followed by discussion of the climates of various regions of the Soviet Union. Ch. XIII covers the climate of the rest of Europe in a similar way; Ch. XIV, the climate of Asia (except U.S.S.R.); Ch. XV, Africa; XVI, Indonesia and Australia; XVII, North and Central America; XVIII, South America; XIX, Arctic and Antarctic; XX, the Atlantic, Pacific and Indian Oceans; XXI, Climate of the free atmosphere (general and regional). A good bibliography and original charts of radiation, radiation balance, Jan. and July pressure, wind frequency, temperature anomalies and cloud cover for each are appended. (For abstract on Pt. 1–2, *see* 4.8–1, Aug. 1953, *MAB.*) *Subject Headings:* **1. Climatology 2. World climate 3. Textbooks. I. Rubinshtein, E. S.** (*ed.*).—*M.R.*

6.11–6 55(02)(08)

†Faul, Henry (*ed.*), **Nuclear geology: a symposium on nuclear phenomena in the earth's sciences.** N. Y., John Wiley, **1954.** 414 p. numerous figs. and tables, eqs. Bibliography, p. 373–406. **DLC**—Articles by 26 authorities on various phases of geology, geophysics, oceanography, nuclear science and radiochemistry are organized in systematic form to produce a text or reference book which will answer many questions the meteorologist encounters in dealing with this peripheral field: C^{14} dating (p. 349–354), rare gases and fission in nature (p. 133–147), origin of earth (p. 355–372), geophysical exploration by nuclear methods (p. 219–255), especially by aircraft (p. 227–231), including effect of nuclear explosions. A most thorough bibliography of over 700 items is appended. *Subject Headings:* **1. Radioactive gases 2. Radiocarbon dating 3. Geochemistry 4. Symposia 5. Textbooks.**—*M.R.*

6.11–7 523.12 551.5:52

Hoyle, Fred, **Frontiers of astronomy.** London, Heinemann, **1955.** 360 p. 67 figs., 59 plates, tables. **GB-MO**—This amazing book is mainly concerned with advanced ideas on cosmology, but it contains much to interest meteorologists. The explanation given for the 24-hr day is that tidal friction is balanced by the effect of atmospheric oscillations. Two alternative causes of ice ages are discussed: a decrease of water vapor at high levels through condensation on meteor dust resulting from the break-up of comets during the past million years, and the turning of the earth relative to its axis of rotation. The structure and internal temperature of the earth are discussed in Ch. 2, radiation from radio waves to γ rays, and the fundamental particles, in Ch. 3. Ch. 4 deals with age determinations. The remaining chapters include, along with much other cosmology, the origin of cosmic rays, solar and stellar magnetism, sunspots and radioastronomy. *Subject Headings:* **1. Cosmography 2. Astronomic meteorology.**—*C.E.P.B.*

6.11–8 551.5:522(02)

†Skilling, William Thompson (*San Diego State College, ret'd*) and Richardson, Robert S. (*Mt. Wilson and Palomar Observatories*), **Brief text in astronomy.** New York, Henry Holt, **1954.** 327 p. figs., tables, photos, charts, bibliog. p. 289–290. **DLC**—This elementary but up-to-date text on astronomy contains many sections which touch on meteorology or climatology. The atmosphere (composition, refraction, twinkling and geomagnetism) is discussed on p. 34–37; meteorites, zodiacal light, counterglow on p. 45–50; time and seasons, p. 59–75; moon's temperature and atmosphere, p. 99–103; eclipses p. 113–120; the solar atmosphere, solar and terrestrial relations, radio astronomy, p. 126–153; planetary atmospheres, albedo, surface temperature, etc. p. 154–186; and meteors, p. 197–204. The text is well illustrated and has a good index and glossary of astronomical terms. *Subject Headings:* **1. Astronomic meteorology 2. Astrophysics 3. Planetary atmospheres 4. Textbooks.**—*M.R.*

6.11–9 551.501.1(02)

U. S. Weather Bureau, **Manual of surface observations (WBAN).** 7th ed. Its *Circular N*, Jan. **1955.** 171 p. forms, tables, figs. **DWB**—This edition of the standard observers manual in use at all first order stations of the U. S. W. B. (and in modified form by Air Weather Service and Navy), contains instructions for observing clouds, visibility, atmospheric phenomena (tornadoes, thunderstorms, squalls, hydrometeors, lithometeors, igneous meteors, luminous meteors), precipitation, temperature, humidity, pressure and wind, and special

types of observation (aviation, synoptic, midnight, runway), coding instructions, forms and pilot reports and marine observation. Simple tables and charts are included for direct use. Amply indexed. *Subject Headings:* **1. Observers manuals 2. Circular N—U. S. W. B. 3. U. S. Weather Bureau manuals.**—*M.R.*

MONOGRAPHS

See also: **Timing of airport traffic control as influenced by weather . . .** (Garbell), 6.11–76; **Climatological atlas of Canada** (Thomas), 6.11–92.

6.11–10 551.524.37:634.8

*Baier, Wolfgang, **Frostbekämpfung im Weinbau. Mit den Ergebnissen der Frostschadenkartierungen in Nordwürttemberg und Nordbaden im Auftrag des Ministeriums für Ernährung, Landwirtschaft und Forsten für Band-Württemberg.** [Frost prevention in viticulture. With results of frost damage mapping in North Württemberg and North Baden under the supervision of the Ministry of Food, Agriculture and Forests of Baden-Württemberg.] Germany. Deutscher Wetterdienst, Berichte, 2(15), 1955. 47 p. of text (with 9 figs., 4 tables, 29 refs.) 12 maps and 24 diagrs (fold. in pocket). Appendix C in separate binding: **Gutachten für die kartierten Weinbaugemeinden.** [Appraisals for the charted vineyard areas.] 385 p. **DLC**—The two large volumes represent a vast compilation and analysis of information on 184 vineyard areas in North Württemberg and 37 areas in North Baden. The first volume contains extensive discussions of vineyards, climatic conditions affecting vineyards, meteorological conditions favoring late spring frost, influence of topography, microclimatic surveys and frost danger charting, methods of preventing frost or frost damage (direct and indirect) including covering, air disturbance, smudging or heating, sprinkling, etc. and a comparison of the different methods. Large multicolor charts show details of frost danger in terms of areas with frequent frost damage in 10 years, occasional (1 or 2 times in 10 years) or seldom (<1 time in 10 years). Also actual % of damage in 1953 is shown by cross hatching. A large regional chart and 24 large detailed charts for smaller areas are included. The second volume contains a page or two of information obtained during appraisal of each of the 224 separate regions or areas. One paragraph contains a summary of the local climatic conditions of each area, as well as paragraphs containing information on the topography, and on preliminary attempts at frost prevention. *Subject Headings:* **1. Frost damage surveys 2. Frost prevention 3. Vineyard protection 4. Baden 5. Württemberg. I. Engelhardt, Wilhelm II. Dinkelacker, Otto III. Linsenmaier, Otto.**—*M.R.*

6.11–11 551.513:551.511:551.551

†Benton, George S., **Atmospheric studies of large scale transfer fields over the North American continent.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract AF 19(122)-365, Final Report, v. 1, Sept. **1954.** 248 p. 86 figs., 4 tables, bibliog. p. 245–248. **MH-BH**—This volume contains a summary of the studies of the water vapor, energy and momentum balance of the atmosphere over North America for the year 1949 that were carried out under Contract AF 19(122)-365 during the period 1950–1954. Much of the material has been published elsewhere either in Technical or Scientific Reports of the Project or in scientific journals. The contents of this volume are as follows: studies of the atmospheric water vapor balance including water vapor transport over North America and the use of atmospheric data in evaluating evapotranspiration; studies of the atmospheric energy balance of the North American continent; a preliminary examination of the mean vertical circulation over the North American continent; lateral eddy stresses in large scale atmospheric turbulence; meridional transfer over the North American continent; and studies of atmospheric turbulence including classification of eddy phenomena, technique of spectrum analysis as applied to large scale atmospheric turbulence and an analysis. Each of these sections is preceded by an abstract and a list of the authors, and publications resulting from this contract are included. *Subject Headings:* **1. Water vapor transport 2. Energy balance 3. Momentum transfer 4. Atmospheric turbulence 5. Large scale exchange. I. Dominitz, Jack (*ed.*) II. Dethier, Bernard E. (*ed.*).**—*I.L.D.*

6.11–12 551.513:551.511

*Benton, George S., **Presentation of meteorological data for the North American sector r the year 1949.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract AF 19(122)-5, Final Report, v. 2, Sept. **1954.** 22 p. numerous tables, figs., eqs. **MH-BH**—The ta presented include: monthly means of the eastward component (*u*) and the northward mponent of the geostrophic wind at each level in meters/second, the elevation of the pressure rface (z) in meters; *T*—the temperature at each level in K° and the mixing ratio (*g*) at the wer three levels in gms/kg; the monthly mean transfer of water vapor by components at ch of the three levels (850, 700, 500 mb) and through the atmosphere; the monthly mean lues of eddy transfer and of enthalpy and latent heat; and the monthly mean values of the vergence of enthalpy and latent heat. A list of the radiosonde stations from which data ere obtained and a table giving the missing data are presented. Brief descriptions of the ethods of computing the data of the time-averaged data and of the punched card deck are cluded. *Subject Headings:* **1. Geostrophic winds 2. Water vapor transport 3. Eddy ansfer 4. Enthalpy 5. Meteorological data 6. North America. I. Dominitz, Jack (*ed.*).** *-I.L.D.*

6.11–13 550.384.3

†Gaibar-Puertas, Constantino, **Variación secular del campo geomagnetico.** [Secular riation of the geomagnetic field.] *Tortosa, Spain, Observatorio del Ebro, Memoria,* No. 11, **953.** printed in Tarragona. 475 p. 80 figs., numerous tables, 454 refs. French and nglish summaries p. xix–xxix. **DWB**—A most elaborate monograph on the theories and gional quantitative variations in the geomagnetic field based on all available magnetic ata for 112 permanent magnetic observatories, 115 temporary observatories and 41 Polar ear Stations (1st & 2nd Int. Polar Years). The volume is filled with charts and data tables owing spatial and temporal variations, and attempts to explain them. A most interesting ature is the effect of petrochemical barriers (such as the Himalayas) on the movements of eomagnetic impulses. Direction and intensity of magnetic field are given equal consideration, are historical and geological time variations. *Subject Heading:* **1. Geomagnetic secular riations. I. Romañá, Antonio.**—*M.R.*

6.11–14 55.1 515.2(691)

§Prudhomme, André and Valtat, B. (*Chief, General Forecasting, Met. Serv., Madagascar*), **tude sur les cyclones tropicaux de la saison chaude 1952–1953 a Madagascar.** [Study of opical cyclones of the 1952–1953 hot season in Madagascar.] *Madagascar. Service Météoro-gique, Publication,* No. 22, **1954.** 101 p. charts, 53 refs. English summary p. 5. **DWB, LC**—This very comprehensive study of tropical cyclones of the 1952–53 warm season at Iadagascar includes the following: a description of individual tropical cyclones based upon n analysis of surface and upper troposphere winds and upon radiosonde data; an analysis the conditions bringing about the formation and development of tropical cyclones including ne rôle of advected polar air and of shear lines and surge lines; the effect of pressure changes outh of latitude 25°S upon the trajectory of tropical cyclones; the rôle of the trade winds of r coming from the Northern Hemisphere; the steering currents of the storms; analysis of the roposphere characteristics during the development of cyclones; the properties of the pressure eld at the ground and its utilization in forecasting formation and trajectory of the storms nd the nature and validity of cyclonic indicators such as convective clouds, torrential rains, rface winds and swell. *Subject Headings:* **1. Tropical cyclone studies 2. Cyclogenesis Madagascar.**—*I.L.D.*

6.11–15 551.515.2(691)

§Prudhomme, A., **Étude sur les perturbations tropicales de la saison chaude 1953/1954 a Iadagascar.** [Study of tropical disturbances in the hot season 1953/1954, at Madagascar.] *Iadagascar. Service Météorologique, Publication,* No. 24, **1955.** 61 p. 12 plates (fold.), 3 refs. **DWB**—This excellent monograph contains a detailed analysis of 4 tropical cyclones nd 4 other tropical disturbances which affected the Madagascar region of the southwestern ndian Ocean during Dec. 1953–April 1954. Synoptic (surface and upper air) and aerological

charts, trajectories, etc. are presented in folded charts for each situation. This study supple ments Publication No. 22 of the Madagascar Service. The conclusions reached are: 1) densit differences are of negligible importance in cyclogenesis; 2) wind discontinuities are essential 3) high pressure in the sub-stratosphere above a tropical disturbance is essential for cyclo genesis. The critical factor in deepening is a discontinuity of the vortex in the barotropi layer just below the tropopause. *Subject Headings:* **1. Tropical cyclone studies 2. Cyclo genesis 3. Madagascar.**—*M.R.*

6.11–16 551.577(410)(058

British Rainfall 1953. Report on the distribution of rain in space and time over Grea Britain and Northern Ireland during the year 1953 as recorded by about 5,000 observers London, H.M.S.O., **1955.** 219 p. 9 figs., 28 tables. *M.O.* 588. **DLC**—This report follow the usual lines: distribution of rain in time—days with rain, droughts and dry spells, rai spells and wet spells, duration of rainfall, heavy falls in short periods, heavy falls on rainfal days, monthly rainfall, seasonal rainfall, total fall of rain in 1953, evaporation and percolation Pt. 2 gives the rainfall for the year at all stations, with average where available, and day with .01 in. or more and .04 in. or more. Pt. 3, by J. GRINDLEY, gives the heaviest rainfall i 10, 20, 60, 90 and 120 min on record (1860–1953) for each county of the United Kingdom The extremes are: 10 min, 1.30 in.; 20 min, 2.12; 30 min, 2.50; 60 min, 3.63; 90 min, 4.10 an 120 min, 4.80. The year 1953 as a whole was below average except in N.W. Scotland. (Fo 1950 Report, *see item* 4.9–178, Sept. 1953; for 1951 and 1952 Reports, *see item* 5.9–229, Sept 1954, *MAB.*) *Subject Headings:* **1. Precipitation data 2. Annual meteorological report 3. Great Britain 4. Northern Ireland. I. Great Britain. Meteorological Office II. Grindley J.**—*C.E.P.B.*

6.11–17 551.582(436

*Steinhauser, F.; Eckel, O. and Sauberer, F., **Klima und Bioklima von Wien, I. Teil Ergebnisse der langjährigen Messreihen an der Zentralanstalt für Meteorologie und Geo dynamik in Wien, Hohe Warte.** [Climate and bioclimate in Vienna, Pt. 1, Results of long period records obtained at the Central Meteorological and Geodynamic Institute at Vienna Hohe Warte.] Vienna, Österreichische Gesellschaft für Meteorologie, **1955.** 120 p. 105+ tables, foot-refs. **DWB**—A comprehensive study of the climate of Vienna containing analysi of solar and sky radiation, air and soil temperature, atmospheric humidity (relative humidity and vapor pressure) and evaporation, cloudiness, sunshine duration, precipitation, wind an atmospheric pressure. Extensive statistical data are included in the text as well as in ap pendices and a glossary of climatological terms is given. *Subject Headings:* **1. Climate o Vienna 2. Long period records 3. Vienna, Austria.**—*I.L.D.*

6.11–18 551.8 551.510.4

Markov, K. K., **Paleogeografiia (istoricheskoe zemlevedenie).** [Paleogeography historical geography.] Moscow, Gos. Izdat., **1951.** 274 p. 59 figs., map (fold.), foot-refs. bibliog. p. 270–274. **DLC**—Chapters 4 and 5, the development of the hydrosphere an atmosphere are of particular interest to oceanographers and meteorologists. Ch. 4 deal with the fundamental physical and chemical characteristics of existing hydrosphere; change in the volume of the hydrosphere; changes in the level of oceanic hydrosphere including change in total volume of oceanic waters, changes in the forms of the geoid, and types of movement o oceanic levels; ancient glaciations as part of the ancient hydrosphere; fundamental change and distribution of seas and dry land; development of the salt regime of the hydrosphere (hypothesis of the fluvial and magmatic origin of marine salts); salinity of the ocean during the Archeozoic, Paleozoic and Permian periods; and changes in the regime of the Caspian Sea and Arctic Ocean during the past several thousand years. In the chapter on origin of the atmosphere the author discusses the chemical and physical properties of the contemporary atmosphere, the origin of atmospheric gases including temperature and gravitational selection of atmospheric gases; comparison of the earth's atmosphere with the atmospheres of other planets of the solar system; history of planetary atmospheres, in particular the earth's at mosphere; development of the climates of the earth (climatic change caused by the com-

position of the earth's atmosphere, by variations in solar radiation and by changes in the earth's surface). *Subject Headings:* **1. Paleogeography 2. Origin of atmosphere 3. Hydrosphere 4. Atmospheric composition.**—*I.L.D.*

6.11–19 551.521.1:620.91

†Daniels, Farrington and Duffie, John A. (*eds.*), **Solar energy research.** Madison, Wisc., Univ. of Wisconsin Press, **1955.** 290 p. 53 figs. (incl. photos), 17 tables, bibliog. for each chapter (272 refs.), eqs. **DWB**—This book is based upon the Symposium on the Utilization of Solar Energy held in Madison, Wisconsin on Sept. 12–14, 1954. The individual papers which vary from abstracts to full reports, deal with the various phases of the availability and utilization of solar energy. The various contributions are arranged according to the following main headings: Expected world energy demands; Nature and availability of solar energy; Meteorology and the utilization of solar energy and Notes on Spectral quality and measurement of solar radiation; Space heating and Domestic uses of solar energy; Solar power; Solar evaporation and distillation; Atmospheric phenomena and conversion of solar to electrical energy (utilization of solar energy in geophysical processes, energy contribution from wind power); Solar thermoelectric generators, maximum efficiency of solar energy conversion by quantum processes, etc; Solar furnaces; Photosynthetic utilization of solar energy and solar energy application and Suggestions for further research. The individual sections are provided with bibliographies and a survey of the United States Patents pertaining to the utilization of solar energy is included. *Subject Headings:* **1. Solar energy utilization 2. Symposia.**—*I.L.D.*

GENERAL GEOPHYSICS AND METEOROLOGY

EXPEDITIONS

6.11–20 91.04(235.24)

Marussi, Antonio (*Inst. of Geodesy and Topogr., Trieste Univ.*), **Lo stato attuale dell'esplorazione geofisica Karakorum.** [Present state of geophysical exploration of Karakorum.] *Geofisica e Meteorologica*, Genoa, 3(1/2):20–22, Jan./April **1955.** 4 refs. **DWB**—Account of geodetic and gravimetric, magnetic and cartographic work of various expeditions to the second highest mountain region in the world—the Karakorum. Italian, Indian, American and other efforts are mentioned. The work of the Italian "Desio" expeditions of 1929 and 1954 is specially noted. *Subject Headings:* **1. Karakorum expeditions 2. Geodesy measurements in high mountains 3. Karakorum Range.**—*M.R.*

6.11–21 523.78

Van Hemert tot Dingshoff, G. A. W. C., **De Nederlandse amateur-expeditie naar Zweden.** [Dutch amateur expedition to Sweden.] *Hemel en Dampkring*, 52(7/9):161–167, July/Sept. **1954.** 7 figs. **MH-BH**—The eclipse (June 30, 1954) expedition by amateurs to Sweden is described. An account is given of the arrangement of the field camp and of the observations made. Photographs illustrating various activities are included. *Subject Heading:* **1. Solar eclipses.**—*I.L.D.*

6.11–22 551.311.17(268)

Akkuratov, V., **Bluzhdaiushchie ostrova** [Floating islands.] *Vokrug Sveta*, Moscow, No. 6:17–21, June **1954.** illus. **DLC**—Evidence of the nonexistence of "new" lands and islands, such as "Sanikov," "Gillis," "Kennan," etc. believed to have been discovered in Arctic seas by explorers of the 19th century and entered in log books and officially registered on maps, has been produced by Soviet navigators and fliers who have crossed the Arctic seas in all directions and have left few former blank spots unexplored. The story of the discovery of the mysterious "Sannikov land" in 1810, of the subsequent search for it and the hypothesis explaining its disappearance are mentioned. The author describes some of his own experiences "discovering" new lands during Arctic flights—they always proved to be either huge drifting icebergs or the play of light and shades in clouds. One such island discovered in the eastern

sector of the Arctic in 1950 by the Soviet flier PETROV has been now named "T-3" or "Fletcher' Ice Island" by Americans—for the American flier who "discovered" it once more. Som photos showing the odd shapes of ice bergs, a sketch map of an ice island discovered by th author in 1948 and a map of the region of the mysterious "Sannikov land" are appended *Subject Headings:* **1. Arctic ice islands 2. Arctic Ice Island (T-3) 3. Arctic.**—*A.M.P.*

6.11–23 551.5:551.311.181:629.12(98

†Jacobsen, N. Kingo, **Artiske problemstillinger i relation til besejlingen.** [Arctic problem in relation to navigation.] *Geografisk Tidsskrift*, Copenhagen, 51:94–133, **1951.** 6 figs. bibliog. p. 131–133. **DWB**—A comprehensive, general review of the meteorological, hydrographic and topographic features of the Polar basin is presented. The oceanographic data collected by the more important expeditions since the "Fram" expedition, the temperature distribution, the ice distribution and its characteristics and the atmospheric circulation are summarized and the achievements of the Northeast and Northwest passages are described. Charts giving ice conditions during various months for the polar basin and showing isolines of depth are included. *Subject Headings:* **1. Arctic navigation 2. Oceanographic data 3. Arctic sea ice 4. Arctic Ocean.**—*I.L.D.*

6.11–24 91.04:629.13(98)

Grierson, John, **Evolution of Arctic airways.** *Royal Aeronautical Society, Journal*, 59(529):15–29, Jan. **1955.** map, photos, port., 4 refs. **DWB**—Historical account of Arctic exploration since FROBISHER (1576) explored the Northwest Passage near Baffin Land—DAVIS, BAFFIN, HUDSON, FRANKLIN in ships; and ANDREE's fatal attempt to cross the Pole in a balloon which iced up at 82°N (near Spitsbergen) in 1897. AMUNDSEN (1925) reached 88°N, BYRD on May 9, 1926 flew from Spitsbergen to the Pole and back in a Fokker (3 motors) and the next day AMUNDSEN and NOBILE flew in the "Norge" across the Pole from Spitsbergen to Teller, Alaska (3000 m in 71 hrs). In 1928 NOBILE in the "Italia" crossed the Pole but iced up and crashed. AMUNDSEN's flying boat was lost in a search for Nobile between Norway and Spitsbergen. Three U. S. Army flyers crossed the Atlantic Arctic in 1924. WILKINS in 1928 flew a single engine Lockheed from Barrow to Spitsbergen via Ellesmere Land. Subsequent flights, the British Arctic Air Route Expedition to Greenland (1931–2), German, Russian, United States, Canadian and, lastly, Scandinavian air route pioneering (1954) are described and illustrated. *Subject Headings:* **1. Arctic air routes 2. Arctic expeditions 3. Arctic exploration 4. Arctic.**—*M.R.*

6.11–25 551.501.9(98) 551.5:629.13(98)

Vodop'ianov, M., **V tsentre Arktiki.** [In the center of the Arctic.] *Smena*, Moscow, No. 12:5–7, June **1954.** illus. **DLC**—Some characteristic events in the life and activity of an Arctic flyer transporting scientific personnel and equipment into the northernmost regions of the Arctic are described and illustrated. The story deals with the difficulty of landing and taking off from pack ice, the establishment and supplying of camps, the organization of meteorological and hydrological observations and other features of existence in the Soviet Arctic. *Subject Headings:* **1. Arctic aircraft operations 2. Arctic weather stations 3. Soviet Arctic.**—*A.M.P.*

6.11–26 91.04(99)

Buĭnitskiĭ, Viktor KHarlampievich, **Antarktika.** [Antarctic.] Moscow, Gos. Izd-vo. Geog. Lit., **1953.** 71 p. map (folded), photos, foot-refs. **DLC**—A small, carefully compiled book presenting the history of the first discovery of the southernmost continent in 1820 by the Russian Antarctic expedition under BELLINGHAUSEN (Princess Martha Land), the ensuing explorations by many countries, the discoveries of the south magnetic and geographical poles, the growing interest aroused by the Antarctic among other countries and their mutual rivalries, as well as ample information and data on the geography, size, geology, climate, ice conditions, atmospheric circulation, tidal movements, bird and animal life and whale fishing of the Antarctic. *Subject Headings:* **1. Antarctic expeditions 2. Antarctic exploration 3. Antarctic.**—*A.M.P.*

ORGANIZATIONS

See also: **Commission for Agri. Met., WMO, 1st Session, Paris, Nov. 1953** (Blanc), 6.11–80.

6.11–27 550.3:061.3 551.590.21

Bartels, Julius, **Vorschau auf das Internationale Geophysikalische Jahr.** [Preview of the nternational Geophysical Year.] *Naturwissenschaftliche Rundschau*, 8(7):262–265, July **955. DWB**—The article describes the nature and effects of solar radiation, sunspots and aculae. The greatest effects are at a height of 50–1000 km above earth's surface. Corpuscular adiations influence geomagnetism, aurora and ionosphere; the last is also ionized by UV adiation. Radio waves of 6–20 m from the sun reach the ground. Finally cosmic radiation onsists mainly of protons. These and many other phenomena form the subjects of the In- ernational Geophysical Year. The plans are summarized. *Subject Headings:* **1. International Geophysical Year program 2. Solar-atmospheric relationships.**—*C.E.P.B.*

6.11–28 551.5:06

Belousov, V. V. and Kalashnikov, A. G., **Assambleia mezhdunarodnogo geodezicheskogo geofizicheskogo soiuza.** [Conference of the International Union of Geodesy and Geophysics.] *Priroda*, Moscow, 44(3):62–69, March **1955.** illus. **DLC**—The authors of this article were nembers of the Soviet delegation to the IUGG Assembly held in Rome in 1954. They sum- narize briefly the contents of some of the more important papers and describe some of the xcursions taken during the course of the meeting. Photographs illustrating the latter are ncluded. *Subject Heading:* **1. I.U.G.G. meetings, Rome, 1954.**—*I.L.D.*

6.11–29 551.5:016:06

World Meteorological Organization. Commission for Bibliography and Publications, Paris, Nov. 24–Dec. 12, 1953, **Report of the United States Delegation to the First Session . . . 1953.** 11 p. Mimeo. **DWB**—A report including comments by ARTHUR W. JOHNSON, who epresented the U. S. at the CB & P meeting in Paris in Nov. and Dec. 1953, on the work ccomplished, the agenda items taken separately and future conduct of meetings. *Subject Headings:* **1. WMO. Commission for Bibliography and Publications 2. WMO meetings. . Johnson, Arthur W.**—*M.R.*

OBSERVATORIES

6.11–30 522

Perel', IU. G., **Otkrytie vozrozhdennogo Pulkova.** [Inauguration of the revived Pulkovo Observatory.] *Priroda*, Moscow, 43(11):67–72, Nov. **1954.** photos. **DLC**—The inaugura- ion of the rebuilt Observatory, almost completely destroyed during World War II, was elebrated on May 20–22, 1954 in the presence of about 500 Soviet and foreign scientists epresenting 17 countries and by a session of the Physical and Mathematical Division of the Academy of Sciences with reports and speeches on the importance of the event and the cientific achievements attained at the Observatory. The inauguration was followed by 2 conferences on problems of astronomy, and research on scintillation, variable stars and cosmogony. The paper includes minutes of addresses delivered at the inauguration and at both sessions. *Subject Headings:* **1. Astronomical observatories 2. Pulkovo Observatory, U.S.S.R.**—*A.M.P.*

6.11–31 522.1

Minnaert, M., **De Sterrewacht te Poelkowo weder opgebouwd, 1839–1954.** [Restoration of the Pulkovo Astronomical Observatory, 1839–1954.] *Hemel en Dampkring*, 52(10):186–189, Oct. **1954.** 3 figs. **MH-BH**—The author described the appearance of the rebuilt ob- servatory which was destroyed by the Germans during World War II, its instrumentation and the type of astronomical research that is being carried on. Apparatus for making photo- electric observations and star transits, a star interferometer, a special type of horizontal tele- scope and an instrument for measuring radial velocities with an objective prism are described. Photographs of the rebuilt observatory are shown. *Subject Headings:* **1. Astronomical observa- tories 2. Pulkovo Observatory, U.S.S.R.**—*I.L.D.*

SERVICES

6.11–32 551.5:01

†**National report on Australian meteorological research 1941–1954.** *I.U.G.G. Bulletin d'Information*, 3(6):214–220, July **1954.** bibliog. p. 219–220. **DWB**—The most importa Australian work during 1951–54 in the fields of (1) Southern Hemisphere general circulatio (2) extended forecasting, (3) Antarctic meteorology, (4) synoptic meteorology, (5) ozon (6) radiation networks, (7) cloud physics, (8) vertical currents and convection, (9) micr meteorology and turbulence, (10) evaporation, (11) agrometeorology, and (12) climat mapping and statistical meteorology are reviewed and a list of 73 articles by 37 Australia authors is appended. Two voyages to the Antarctic were undertaken (one winter in Adél Land) to study heat economy of the region. *Subject Headings:* **1. Meteorological researc 2. Bibliography of Australian meteorological literature 3. Australia 4. Antarctica.**—*M.R.*

6.11–33 551.5:06:01

†Norway. Meteorologiske Institutt, **Årsberetning for Budsjettåret 1 Juli 1952 til 3 Juni 1953 for de Meteorologiske Institusjoner i Norge.** [Annual report, July 1, 1952–June 3(1953, for the Meteorological Institutes of Norway.] Oslo, Grøndahl, **1954.** 60 p. Meteor logical publications of the staff, p. 24–28 (66 titles). **DWB**—Details of weather service, bot administrative and scientific, are given, with a list of personnel in various divisions and region and a list of publications by personnel. International conferences attended by members the Service and national scientific and publications activities as well as work in forecastin climatology, instruments, precipitation (hydrology) and library activities are outlined. *Sul ject Headings:* **1. Annual service reports 2. Meteorological research 3. Bibliography o Norwegian meteorological literature 4. Norwegian meteorological service 5. Norway** —*M.R.*

6.11–34 551.5:01

†Vandenplas, A., **L'activite meteorologique en Belgique de 1951 a 1953.** [Meteorologica activity in Belgium, 1951–1953.] *I.U.G.G. Bulletin d'Information*, 3(6):221–231, July **1954** bibliog. p. 228–231. **DWB**—Activity is described in following fields: climatology (general local and agricultural), radiation, aerology, thermodynamics, dynamics of the atmospher and history of meteorology. A good bibliography of 83 references classified under abov headings is appended. *Subject Headings:* **1. Meteorological research 2. Bibliography o Belgian meteorological literature 3. Belgium.**—*M.R.*

6.11–35 5

U. S. Congress. House. Committee on the Territories, **Bills to authorize an appropriatio for the establishment of a Geophysical Institute at the University of Alaska.** Hearings before the Committee on the Territories, House of Representatives, 79th Congress, Second session pursuant to H.R. 4785, H.R. 6431 and H.R. 6486. Wash., D. C., U. S. Govt. Print. Off. **1946.** 60 p. Hearing held May 10–11, 1946. **DLC**—Statements by J. A. Fleming, Ross Gunn, L. V. Berkner, F. W. Reichelderfer, S. L. Seaton, H. W. Wells, Charles E. Bunnell and other authorities on various branches of geophysics and on Alaska, as presented on May 10 and 11, 1946 in hearings, are given verbatim. These resulted in appropriation o **$1,000,000** for a geophysical research institute at the University of Alaska, College, Alaska. Work on aurora, cloud or precipitation electricity, magnetic storms, radio wave propagation, air mass studies, etc. were suggested for possible research projects. A short history of auroral and geophysical work at College, Alaska, beginning in 1930 is included. *Subject Headings:* **1. Alaska. University. Geophysical Institute 2. Geophysical research 3. Auroral research 4. Arctic research.**—*M.R.*

6.11–36 551.5:06(058)

†Germany. Deutscher Wetterdienst, **Jahresbericht für das Jahr 1953.** [Annual report for 1953.] Its *Jahresberichte*, No. 1, pub. **1954.** 47 p. 7 figs., 7 tables, bibliog. p. 36–46 **DWB.** *Idem*, **Jahresbericht für das Jahr 1954.** [Annual report for 1954.] Its *Jahresberichte*, No. 2, pub. **1955.** 52 p. 8 figs., 8 tables. p. 40–41, Publications of the Weather Service.

42–52, Publications and lectures of staff members. **DWB**—The first article is a most orough and systematic report on the present organization and the activities during 1953 the new Bundesanstalt Deutscher Wetterdienst, formed early in 1953 and made up of the eutscher Wetterdienst in der U. S. Zone (Bad Kissingen), the Meteorologisches Amt für ord-westdeutschland (Hamburg), the Wetterdienst Rheinland-Pfalz, the Landeswetterdienst Württemberg) and the Hohenzollen und Landeswetterdienst (Baden). Includes the per-nnel as well as organization, networks, statistics on upper air observations, stations of various sses, centers of service activities, work of various divisions (aviation, agrometeorology, arine and aerological) and, finally, the library and publications of branches of new services d individual authors, speeches by members of service, etc. The second article covers the 54 activities of the Weather Service of West Germany. *Subject Headings:* **1. Meteorological rvices 2. German Weather Service 3. Bibliographies 4. Annual service reports 5. West ermany. I. Benkendorff, Rudolf.**—*M.R.*

6.11–37 551.5:06 551.579:06

Sweden. Meteorologiska och Hydrologiska Institut, **Coordination of the meteorological d hydrological services in Sweden.** Stockholm, Dec. **1949.** 6 p. Mimeo. **DWB**—The edish Meteorological and Hydrological Services were coordinated in 1919 by combining e Central Meteorological Institute (founded 1873) and the Hydrological Bureau (founded der Dept. of Agriculture in 1908). In 1945 the name was changed to its present form. ne two services have separate directors but the combined services are under an "Överdirektör." ne article reviews the 30 years of experience of the combined services, and the organization d activities of the two main sections. The Hydrologic section deals with river gaging, od forecasting, snow surveys, temperatures of inland waters, control and research on reser-irs for power, ice investigations and hydrography. The Meteorological Bureau carries on ual weather service activities. The advantages of joint management are set forth, especially snow, precipitation and ice measurement and forecasting. *Subject Heading:* **1. Swedish eteorological and hydrological services.**—*M.R.*

6.11–38 551.5:06(54)

Report on the work of the Pakistan Meteorological Service. *I.U.G.G. Bulletin d'Information*, 3(6):289–295, July **1954. DWB**—Complete details of the many phases of meteorological service in Pakistan are provided in this well outlined report. The service now consists 100 surface, 20 pilot balloon, 1 rawin, 4 radiosonde, 10 agrometeorological and 500 precipitation stations. Three principal, 3 smaller and 3 local forecast offices or centers are also provided. sferics network of 6 stations (3 in East and 3 in West Pakistan) is being organized. Climatology, archives and library, instrument shop, hydrometeorological service and service to iation, shipping, ports, inland navigation, farmers and the general public are described. esearch on cloud physics and rain stimulation is also described. Ozone and solar radiation search is also being conducted by the atmospheric physics section at Quetta. *Subject eadings:* **1. Pakistan weather service 2. Networks 3. Artificial precipitation 4. Pakistan.** *M.R.*

CONFERENCES

See also: **Midwestern Conf. on Fluid Mech., Proceed.,** 6.11–2, 6.11–3; **Conference of I.U.G.G.** (Belousov, Kalashnikov), 6.11–28.

6.11–39 551.5:681.1:061.3

Frenkiel, Francois N. (*Appl. Phys. Lab., Silver Spring, Md.*), **Some new scientific trends meteorology.** *Science*, 120(3115):408–409, Sept. 10, **1954. DLC**—Report on conference ld at U.C.L.A. on May 13–15, 1954, to explore the uses of high speed computing machines meteorology and oceanography. It was concluded that numerical prediction can be applied flow patterns for 1 or 2 days ahead, or to hurricanes, flood conditions, atmospheric pollution tterns, effect of wind on sea movements (currents, waves and tides), and other fields where e laws of physics can be applied objectively. This can relieve the scientist or technician the burden of preliminary analysis so he can use his skill and imagination in application of e analysis or, when it fails, to improving the machine work. Members of Conference

Steering Committee are listed. *Subject Headings:* **1. Numerical forecasting 2. Computi machines 3. Conference reports.**—*M.R.*

6.11–40 551.5(001) 551.58(00

Schmuck, Adam (*Wrocław*), **Na marginesie dyskusji w czasie Konferencji Klimatologiczn we Wrocławiu.** [Comments on the discussion during the Conference on Climatology Wrocław.] *Czasopismo Geograficzne*, Warsaw, 25(3):306–308, **1954. DWB**—The proble of defining the boundary between meteorology and climatology, the question of a controversi paper dealing with one meteorological element pertaining to climatology, and the autho reports on the achievements of Polish climatologists are reviewed. While meteorology, th science of physics of the atmosphere, describes, investigates and analyzes an element or th complex of phenomena occurring in the atmosphere from the viewpoint of physics; climatolog attempts to illustrate (cartographically) the spatial distribution of one or of a whole compl of elements, and to coordinate all meteorological elements with all geographical factors in given territory. Their combined process is the climate of the region. Meteorology invest gates phenomena mainly in a vertical direction, while climatology studies them in the hor zontal. The domain of meteorology is much broader; climatology is, therefore, a part meteorology. Both sciences are based on meteorological observations and it is difficult draw a line between them, which is not as important as to study how they supplement ea other as parts of the science of nature. Finally, the author lists a number of papers whic although dealing with one meteorological element are considered by him to pertain to clim tology. *Subject Headings:* **1. Meteorology 2. Climatology 3. Definitions.**—*A.M.P.*

BIOGRAPHY, EDUCATION AND HISTORY

BIOGRAPHY

6.11–41 551.5:9

Israel, H. and Toperczer, M., **Hans Benndorf.**† *Archiv für Meteorologie, Geophysik un Bioklimatologie, Ser. A*, 6(1):111–113, **1953. MH-BH.** Also: Székely, A., **Prof. H. Benndor** *Nature*, London, 173(4399):335, Feb. 20, **1954. DWB**—Born Dec. 13, 1870 at Zurich, die Feb. 11, 1953 at Graz. Especially interested in atmospheric electricity. Designed registerin electrometer (1902) and wrote numerous memoirs. Also worked on seismology. *Subje Headings:* **1. Biography 2. Benndorf, H.**—*C.E.P.B.*

6.11–42 551.5:9

Bilancini, Raoul, **Władysław Gorczyński [Obituary].** *Rivista di Meteorologia Aer nautica*, 14(1):80, Jan./March **1954. DWB.** Also in: *Meteorological Magazine*, Londo 82(976):317, Oct. **1953. MH-BH**—Died June 25, 1953, aged 73. Organized State Meteor logical Service in Poland; made actinometric expeditions. In 1947 appointed Professor Meteorology and Climatology at Copernicus University, Torun. *Subject Headings:* **1. Obit uaries 2. Gorczyński, Władysław.**—*C.E.P.B.*

6.11–43 551.5:9

Merrill Bernard, President of the International Association of Hydrology [Obituary. *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951, (Transactions)*, 1:16–17, 1952 **DWB**—Born in Burlington, Iowa on July 25, 1892; died April 15, 1951. Chief of the Divisio of Climatological and Hydrologic Services in the U. S. Weather Bureau at time of death *Subject Headings:* **1. Obituaries 2. Bernard, Merrill.**—*A.A.*

6.11–44 551.5:9

Hagen, Norman R., **Benarthur C. Haynes (1909–1954) [Obituary].** *American Me teorological Society, Bulletin*, 35(7):300, Sept. **1954. MH-BH**—Presents a brief sketch B. C. Haynes' contributions to meteorology and a list of his more important publication *Subject Headings:* **1. Obituaries 2. Haynes, Benarthur C.**—*I.L.D.*

6.11–45 551.5:92

Frankcom, C. E. N., **Obituary [of] Commander J. Hennessy.** *Weather*, 9(6):185, ıne **1954. MH-BH.** Idem, *Nature*, London, 174(4419):63, July 10, **1954. DWB;** *Me-ɔrological Magazine*, London, 83(985):220–221, July **1954. MH-BH;** *Marine Observer*, 4(166):200–201, Oct. **1954.** photo. **MH-BH.** *Also:* Burgess, C. R., **Commander J. Hen-ɛssy, M.B.E., R.D., R.N.R.** *Weather*, 9(11):355, Nov. **1954. MH-BH**—Born Dec. 1885. t sea until 1919, then Deputy Marine Superintendent of the British Meteorological Office ıtil his death on May 22, 1954. He reorganized fleet of voluntary observing ships which ɛveloped in 1930 into "Selected Ship" system. Supervised preparation of many marine ılases and Hollerith punched card system for marine data since its introduction in 1921. Iember of Commission for Maritime Meteorology. *Subject Headings:* **1. Obituaries 2. Hen-ɛssy, J.**—*C.E.P.B.*

6.11–46 551.5:91:92

Hall, Robert Burnett, **William Herbert Hobbs, 1864–1953.** *Association of American ɛographers, Annals*, 93(4):284–288, Dec. **1953. DLC.** *Also:* Hubbard, George, *Science*, 17(3046):521–522, May 15, **1953. DLC.** And also: Blyth, J. D. M., *Polar Record*, 6(46): 39–840, July **1953;** and *Nature* 171(4349):416–417, March 7, **1953. DWB**—Born Worcester, Iass., July 2, 1864, died Ann Arbor, Mich., Jan. 1953. Took degree in geology at Worcester ıne 1883 and lectured at Univ. of Wisconsin 1891. Professor of Geology at University of Iichigan 1906–1934. Worked on glaciology and in 1926 led first Univ. of Michigan expedition) Greenland to find evidence for his "glacial anticyclone." Among the 400 works credited Prof. Hobbs (100 of which were published after he retired at the age of 70) are articles on ans-Atlantic flying, glacial and polar anticyclones, Arctic visibility, etc. His students ımber many outstanding geographers working in climatology, hydrology and related branches geophysics. *Subject Headings:* **1. Hobbs, William Herbert 2. Biography 3. Arctic search.**—*C.E.P.B., M.R.*

6.11–47 551.5:92

Dryden, Hugh L. (*Dir., NACA*), **Ludwig Prandtl, 1875–1953 [Obituary].** *Journal of ɛ Aeronautical Sciences*, 20(11):779, 800, Nov. **1953.** 3 refs. **DWB.** Also: Schröder, Kurt, **ıdwig Prandtl zum Gedächtnis.** [In memory of Ludwig Prandtl.] *Wissenschaftliche ɔnnalen*, 2(11):713, Nov. **1953. DLC**—Died in Göttingen on Aug. 15, 1953 aged 78. Im-ɔrtant contributions on torsion strength, theory of plasticity, boundary layer theory, eddy rmation, aerodynamics and dynamic meteorology. *Subject Headings:* **1. Obituaries 2. Tur-ılence research 3. Prandtl, Ludwig.**—*A.A.*

6.11–48 551.5:92

Weickmann, L. F., **Erich Regener† [Obituary].** *Meteorologische Rundschau*, 8(3/4):41, arch/April **1955. MH-BH**—The death of E. REGENER on Feb. 27, 1955 removed one the few German physical meteorologists. His work on cosmic radiation, registering balloons d upper atmospheric condensation is reviewed. *Subject Headings:* **1. Biography 2. Re-ɔner, E.**—*C.E.P.B.*

BIBLIOGRAPHY

See also: **Report of U. S. Delegation to 1st Session of WMO, 1953** (WMO), 6.11–29.

6.11–49 551.5:016

†Argentina. Servicio Meteorológico Nacional, **Selección de reseñas bibliográficas me-ɔrológicas y geofísicas, 1953.** [Selection of bibliographic reviews in meteorology and ophysics, 1953.] Its *Publicación, Ser. G*, 1953, pub. **1954.** 79 p. 377 refs. **DWB**—A nilar compilation to the 1951 and 1952 issues of old and new material received in 1953 by ɛ Argentine Meteorological Service. Abstracts vary greatly in length, are arranged accord-ɛ to major U.D.C. headings, with a general subject index and an author index. Analytics serial publications, as well as monographic material, are included. Abstracts are in Spanish t citations are in original language only. (For abstract of 1952 issue, *see* 6A–62, Jan. 1955,

MAB.) *Subject Headings:* **1. Bibliographies of meteorological literature 2. Meteorolog accession lists 3. Meteorology abstracts 4. Argentina.**—*M.R.*

6.11–50 551.5:63:01

†Germany. Deutscher Wetterdienst, **Agrarmeteorologische Bibliographie, 1950.** [Agr cultural meteorology bibliography, 1950.] Ed. by Max Schneider. Its *Bibliographien* No. 1, Bad Kissingen, **1955.** 129 p. 1543 refs. **DWB**—This bibliography is a continuatio of the Agricultural Meteorological Bibliographies 1949, Pt. 1, and 1949, Pt. 2, which wer issued by the Deutsche Wetterdienst in the U. S.-Zone. It contains the literature availabl to the Central Bureau of the German Weather Service during the period Jan. 1/Jan. 31, 195(The 1543 citations cover the world literature in the field of agricultural meteorology; of cours the German literature is best represented. The citations are annotated and arranged b subject. A list of the publications covered and an author index are included. (For Pts. 1– of 1949 issue *see* 3.2–167 and 4.3–19 in Feb. 1952 and March 1953, *MAB.*) *Subject Headings* **1. Agricultural meteorology bibliographies 2. Bibliographies. I. Schneider, Max (*ed.*)** —*I.L.D.*

6.11–51 535(05) 551.59

Optical Society of America, Philadelphia, **Journal, 1917**— Latest issue seen, 44(12) Dec. **1954.** Monthly. Editor, Wallace R. Brode. Issued for the Society, by the America Institute of Physics. Price: $12.50, yearly from the Institute, 57 East 55th St., N. Y. 22 N. Y. Dec. 1954 issue consists of 2 parts. Pt. 1, Cumulative Index, v. 1–40, 1917–195(Index editor, Mary E. Corning. Alphabetical author index, and Alphabetical subject index Pt. 2, Directory Number. Price: for both parts, $3.00. **DLC, DWB**—Frequently contain articles on albedo, visibility or atmospheric optics. Indexes are detailed. *Subject Headings* **1. Optical periodicals 2. Atmospheric optics.**—*M.R.*

EDUCATION

6.11–52 551.5:37

U. S. Air Weather Service, **Three weather training courses for AACS personnel.** *U. S. Air Weather Service, Training Guide,* No. 50-8, Jan. **1954.** 8 p. **DWB**—Detailed outline o courses in 3 fields: A. **Weather observing training program for control tower operators** B. **Weather training program to assist AACS personnel interpret weather information** C. **Weather indocrination training program for AACS personnel.** No textual or illustrative material, or references for study. *Subject Heading:* **1. Training courses in meteorology.**—*M.R.*

6.11–53 551.5:8

Dufour, L., **Les écrivains et la météorologie.** [Authors and meteorology.] *Ciel et Terre,* Uccle, 70(1/2):23, Jan./Feb. **1954. MH-BH**—Quotation of a brilliant passage from **Émile** by J. J. ROUSSEAU, wherein the famous writer describes the meteorological phenomena attending a sunrise, and other passages of meteorological interest from ROUSSEAU's **Confessions** *Subject Headings:* **1. Meteorology in literature. I. Rousseau, Jean Jacques.**—*M.R.*

6.11–54 551.5:019.941

Selitrennikov, G., **Nuzhnoe posobie po meteorologii.** [A useful contribution to meteorology.] *Morskoĭ i Rechnoĭ Flot,* Moscow, 14(1):32, Jan. **1954. DLC**—A detailed review of Zhukovski, G. R., **Meteorologiia,** a textbook which is suitable for students in higher navigation schools. The book deals with physical meteorology, atmospheric processes and with forecasting. Practical examples of forecasting involving the use of synoptic charts and advective-dynamic processes are given. *Subject Headings:* **1. Meteorology 2. Reviews.**—*I.L.D.*

HISTORY

6.11–55 551.5(09)

†*Arakawa, Hidetoshi, **Kisho-gaku Hattatsu-shi.** [History of weather science.] Tokyo, Kawade Book Co., Ltd., **1947.** 174 p. tables, refs. throughout. **DLC**—Contains 5

:hapters on: 1) history of theoretical and applied meteorology, 2) history of government veather services, 3) history of WMO and IUGG, 4) history of meteorological societies and ournals and 5) biography of outstanding meteorologists. *Subject Heading:* **1. History of neteorology.**—*H. Arakawa.*

6.11–56 551.509(09)

Simpson, Sir George, **Fitzroy and weather forecasts.** *Meteorological Magazine*, London, 34(996):167–173, June **1955.** fig., ports. **DWB.** Repr. from: **The development of weather forecasting,** in: *Nineteenth Century and after*, London, 101:557, **1927.**—Storm warnings to ports were proposed in 1859 by FITZROY in Britain and LE VERRIER in France. Regular forecasts began in 1861 but were abandoned in 1866 after FITZROY died and the Meteorological Office came under the Royal Society. They were resumed in 1879, when they were based on synoptic charts. *Subject Headings:* **1. History of weather forecasting. I. Fitzroy, Robert.**—*C.E.P.B.*

APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Arctic problems in relation to navigation** (Jacobsen), 6.11–23; **Energy theory of sea swell** (Gelci, Gazale), 6.11–264.

6.11–57 551.46.018(08)

†U. S. Office of Naval Research, **Symposium on oceanographic instrumentation, Rancho Santa Fe, California, June 21–23, 1952.** Sponsored by the Office of Naval Research (and the) Division of Physical Sciences, National Research Council. *National Research Council, Wash., D. C., Publication* No. 309, **1952.** 233 p., figs., bibliogs. **DLC**—Contents: Isaacs, John D., **Considerations of oceanographic instrumentation,** p. 1–12. Von Arx, William S., **Measurements of the oceanic circulation in temperate and tropical latitudes,** p. 13–35. Appendix, **Current measurement,** p. 21–27. bibliog. p. 31–35. Ahlstrom, Elbert H., **Biological instruments,** p. 36–54. bibliog. p. 51–54. Vine, Allyn C., **Oceanographic instruments for measuring temperature,** p. 55–69. 4 figs. Raitt, Russell W., **Geophysical measurements,** p. 70–84. bibliog. p. 83–84. Barnes, Clifford A., **Sea ice problems,** p. 85–100. bibliog. p. 99–100. Hersey, J. B., **Acoustic instrumentation as a tool in oceanography,** p. 101–122. figs., bibliog. p. 122. Kielhorn, William V., **Considerations in the construction of oceanographic vessels,** p. 123–138. diagr. Snodgrass, F. E., **Wave measurements,** p. 139–165. bibliog. p. 163–165. Carritt, Dayton E., **Chemical measurements,** p. 166–193. table, figs., bibliog. p. 191–193. Dietz, Robert S., **Methods of exploring the ocean floor,** p. 194–209. 4 figs., bibliog. p. 209. Munk, Walter H., **Air-sea boundary processes,** p. 210–224. table, bibliog. p. 222–224. **DLC**—In order to collect and preserve present knowledge of obscure as well as common instruments used in oceanographic research (temperature, salinity, currents, waves, ice, ocean floor, boundary layer, acoustics, microseisms, etc.), the symposium was held and results published with many illustrations and references to literature. Articles by SNODGRASS, and by MUNK, on **Ocean wave instruments,** and on **Air-sea boundary study instruments** and discussions thereof are abstracted separately. *Subject Headings:* **1. Oceanographic instruments 2. Symposia. I. Isaacs, John D., *ed.* II. Iselin, Columbus O'D., *ed.***—*M.R.*

6.11–58 551.46

Deep water movements in the ocean. *Observatory*, London, 75(885):56–60, April **1955.** refs. **DLC**—At the Royal Astronomical Society on Oct. 22, 1954, K. F. BOWDEN discussed vertical meridional section of salinity and temperature in Atlantic. It is estimated that Antarctic bottom water takes 1800 yrs to reach the equator. E. T. EADY described results of theoretical investigations of currents due to surface wind, W. V. R. MALKUS on the dynamic-thermodynamic mechanisms, T. V. DAVIES and M. S. LONGUET-HIGGINS described experiments at Cambridge, Chicago and Woods Hole, and J. CREASE described attempts to measure ocean currents from R.R.S. "Discovery II." *Subject Heading:* **1. Oceanic circulation.**—*C.E.P.B.*

6.11–59 551.5:06(058)(42)

*Liverpool Observatory and Tidal Institute, Birkenhead, England, **Annual report, 1953.** Pub. **1954.** 15 p. figs., table. p. 15: **Meteorological summary, 1953. DWB**—Annual report including a list of the Staff, mention of the year's publications, a brief account of the Jan. 31–Feb. 1, 1953 North Sea storm surge with illustrative figures of water level, account of the year's work including the use of a new sunshine sphere and a new rain gage, plans for future operations and research and a meteorological summary for Bidston, England, comparing 1953 mean values of the various elements with past normals. *Subject Headings:* **1. Annual service reports 2. Liverpool Observatory and Tidal Institute, Birkenhead, England 3. Annual meteorological reports 4. Bidston, England.**—*M. P. Kramer.*

6.11–60 551.46:06

Merriman, Daniel (*Dir., Bingham Oceanog. Lab.*), **The Bingham Oceanographic Laboratory, Yale University.** *American Institute of Biological Sciences, Washington, D. C., A.I.B.S. Bulletin*, 4(5):27–28, Oct. **1954. DLC**—Brief account of history and activities of the Bingham Oceanographic Laboratory. The Laboratory was founded in 1930 and began working in physical oceanography in the mid-30's. Its chief aim is "to provide research facilities for a small but highly qualified staff of investigators and for a few graduate students who are trained with individual attention." The staff consists of 10–12 full-time workers. In connection with the Laboratory's aims, the author states the merits of pure scientific research in oceanography. The **Journal of Marine Research** is a by-product of the activities of this laboratory. A course in "Meteorology and Oceanography" is the only course given to undergraduates. *Subject Headings:* **1. Bingham Oceanographic Laboratory. Yale University 2. Physical oceanography.**—*G.T.*

6.11–61 551.463

Abe, Tomosaburo (*Met. Res. Inst., Tokyo*), **A study on the foaming of sea water, Pt. 1, On the mechanism of the decay of bubbles and their size distribution in foam layer of sea water.** *Papers in Meteorology and Geophysics*, Tokyo, 5(3/4):240–247, Jan. **1955.** 7 figs., 4 tables, 8 refs., 12 eqs. **DWB**—In considering the process of the decay of foam layer of sea water, the author has introduced the same quantity "A" as the activation energy in chemical changes. "A" increases with increasing concentration of sea water, up to a certain maximum, and then decreases with further increase of concentration. He also discussed the frequency distribution of the size of bubbles in the foam layer by means of statistical methods. The theoretical values of the frequencies calculated by statistical methods agreed fairly well with those obtained by experiments; thus it appears that it is possible to deal with the phenomenon of foaming by means of statistical methods of mathematical probability. *Subject Headings:* **1. Foam layer of sea water 2. Bubble size distribution.**—*Author's abstract.*

6.11–62 551.556:551.465

Walden, Hans, **Höhe der Windsee in einem wandernden rechteckigen Windfeld.** [Height of the wind sea in a travelling rectangular wind field.] *Deutsche Hydrographische Zeitschrift*, 7(3/4):129–139, **1954.** 12 figs., 4 refs., eqs. German, English and French summaries p. 129–130. **DWB**—The effect of a travelling wind field in a depression on sea disturbance is worked out for three cases: wind at right angles to, opposed, and exactly in the direction of displacement of the wind field, for different widths and speeds of the field. A method is given for calculating the height and period of wind waves in a travelling disturbance. *Subject Heading:* **1. Wind effects on water surfaces.**—*C.E.P.B.*

6.11–63 551.556:532.593

Walden, Hans, **Über die Dünung aus einem neu gebildeten Sturmfeld.** [Swell produced by a newly generated storm area.] *Deutsche Hydrographische Zeitschrift*, 7(5/6):174–183, **1954.** 5 figs., 7 refs. German, English and French summaries p. 174. **DWB**—The processes leading to the generation of swell at a fixed observation point A are examined. Two special cases are distinguished: 1) the wind area is stationary, 2) the wind area is moving directly to point A. Only if the distance between the fetch and point A is great enough the swell begins at point A with very long periods; in all other cases, waves with a period of medium length

ill be the first to arrive at point *A*. Finally, the author shows that swell waves that just tarted developing may very rapidly reach a considerable height, so that the observer often annot help thinking that swell develops "in no time." *Subject Heading:* **1. Wind waves.**—*uthor's abstract.*

6.11–64 551.556:532.593

Walden, Hans, **Über die Dünung aus einem Windfeld, welches am Beobachtungsort in iniger Entfernung vorbeizieht.** [On the swell generated by a wind-field passing at some istance from the observation point.] *Deutsche Hydrographische Zeitschrift*, 7(5/6):183–197, 954. 8 figs., 7 refs., 39 eqs. German, English and French summaries p. 183–184. **DWB**—he paper treats the rather complex conditions that may lead to the occurrence of swell at fixed observation point *A* when the wave generating fetch, though approaching point *A*, asses it at some distance. Two contingencies are separately discussed: 1) moving fetches ssociated for a long time past with a fully developed wind sea, 2) moving fetches whose eneration took place only quite recently. The paper includes a diagram which largely cilitates the determination of the "angular spreading factor" (W. J. PIERSON, Jun.; G. EUMANN and R. W. JAMES [1953]). In the end, the question is discussed whether one oint on the border of the fetch may be regarded as being sufficiently representative of the ntire lee-side of the fetch. *Subject Heading:* **1. Wind waves.**—*Author's abstract.*

6.11–65 551.556:525.69

Thiel, Gustav, **Über die Auswirkung der ablenkenden Kraft der Erdumdrehung auf die Vasserstände im Grossen Belt.** [On the effect of the deflecting force of the earth's rotation n the water level in the Great Belt.] *Deutsche Hydrographische Zeitschrift*, 7(5/6):162–173, 954. 6 figs., 5 tables, 8 refs., 3 eqs. German, English and French summaries p. 162. **DWB**—Tide-gage observations and currents are analyzed for periods in 1937–38. The observed alues are less than half those calculated from the deflecting force. The difference is attributed o meteorological factors. Winds from SW–N cause an inflow into the Baltic and winds from E–S an outflow. *Subject Headings:* **1. Tidal fluctuations 2. Wind effect on tides 3. Great elt.**—*C.E.P.B.*

6.11–66 551.5:656.608

Roll, H. U., **Statistisches über Schiffsunfälle durch Wetter.** [Statistics of ship accidents rough weather.] *Wetterlotse*, No. 73:148–152, July **1954.** 2 figs. **DWB**—World shipping st through weather, as a percentage of all losses, varied little year by year 1947–52 from 13% nd showed no progressive change. German shipping decreased from 22% in 1949 to 12% in 953. The decrease was not shown by the fishing fleet, and is attributed to the growing number new ships in the trading fleet. *Subject Heading:* **1. Marine disasters.**—*C.E.P.B.*

6.11–67 629.123

Hebecker, Otto, **Wind, Seegang und Stabilität.** [Wind, sea disturbance and stability.] *Vetterlotse*, No. 88:105–117, June **1955.** 7 figs. **DLC**—Pt. 1 summarizes the present theory stability. Weight stability, depending on the position of the center of gravity, is distinguished from form stability, which depends on the height MG of the metacenter and the idth B of the ship. The period of roll is approx. $0.8\,B/\sqrt{MG}$ sec, and for stability should be etween B and $2\,B$, but in short ships it increases markedly on the wave crest. Pt. 2 deals ith the practical measurement of wind and sea effects by steering the ship in a circle. An xample is discussed in great detail. *Subject Heading:* **1. Ship stability.**—*C.E.P.B.*

6.11–68 551.584.6:629.123

Macht, Hans G., **Die Abkühlung warmer organischer Massenladungen durch anhaltende rischluftversorgung der Laderäume. Ein Beitrag zur Schiffsraum-Meteorologie.** [The ooling of warm organic cargoes by continuously supplying the hold with fresh air. A contribuon to ship-cargo meteorology.] *Der Seewart*, Hamburg, 15(6):212–219, Dec. **1954.** fig., 8 refs. **WB**—Electrical temperature, humidity and wind instruments have been used by the Seewetramt since 1951, and earlier observations (1934/5) evaluated to determine the effects of entilation and cooling of cargo, such as wheat and rice, on spoilage. References to 8 articles

written in German (1951–54) on cargo ventilation are cited. A nomogram is presented showing rate of cooling from 0 to 50 cm depth in grain cargo when the surface is cooled suddenly from 30 to 20°C. In 10 days a cooling of 6° occurs at 15 cm and 2° at 33 cm. *Subject Headings:* **1. Cargo ventilation 2. Ship's hold climates 3. Marine meteorology.**—*M.R.*

AERONAUTICAL METEOROLOGY

See also: **Evolution of Arctic airways** (Grierson), **6.11–24.**

6.11–69 551.510.53:629.13 551.509.58:629.1

*Dwyer, W. A. (*Supt. Aviation Meteorology, Australian Meteorological Branch*), **Meteorology and the operation of high altitude aircraft.** *Australian Meteorological Magazine*, Melbourne, No. 3:22–37, May **1953.** 4 tables. **DWB**—A technical discussion of performance characteristics and requirements of jet aircraft for meteorological information. Author states that whereas it was first thought that high altitude flying would decrease the need for meteorological reports and forecasts for aviation, instead it is evident that it requires the most accurate reports and forecasts, and meteorological development has not kept pace with aeronautical development. Temperature, wind, cloud, turbulence, visibility, icing, and hail are a few of the elements which are discussed as to observational and forecast accuracy required and accuracy realized at various flight levels. *Subject Headings:* **1. Jet aircraft requirements 2. High altitude flying.**—*M.R.*

6.11–70 551.506.1(899):551.59

*Uruguay. Servicio Meteorológico. Meteorología Aeronáutica, **Estadística de techo y visibilidad. Ocurrencia de la condición I, basada en las observaciones horarias efectuadas en el Aeropuerto Nacional de Carrasco, during los años 1949–1953.** [Ceiling and visibility statistics. Frequency of condition I, based on daily observations at the National Carrasco Airport, 1949–1953.] First ed. Sept. **1954.** 5 p. 4 tables. Mimeo. **DWB**—Hourly, daily and monthly frequencies and totals of low cloud and poor visibility combined, are tabulated and discussed, based on 1949–53 data for Carrasco Airport (Montevideo), Uruguay. *Subject Headings:* **1. Ceiling and visibility data 2. Carrasco Airport, Montevideo, Uruguay**—*M.R.*

6.11–71 551.578:629.135

*Useller, James W.; Lewis, William and Zettle, Eugene V. (*Lewis Flight Propulsion Lab., NACA*), **Effect of heavy rainfall on turbojet aircraft operation.** *Aeronautical Engineering Review*, N. Y., 14(2):40–42, Feb. **1955.** 3 figs., 2 refs., table. **DWB, DLC**—Assuming maximum rainfall rate of 12.4/hr which may be expected for ½ min in 100 yrs of flight time, it is found that the maximum water-air ratio which might be ingested in turbojet flight even at landing speeds would be insufficient to cause serious operational difficulties. Water taken into air cooling system for bearings, however, might corrode metal parts and cause trouble unless dry air is immediately drawn in following a period of flight through heavy showers. *Subject Headings:* **1. Rainfall effect on jet aircraft 2. Turbojet operations.**—*M.R.*

6.11–72 551.5:629.13

*Georgii, Walter, **Flugmeteorologie grosser Höhen.** [High altitude flight meteorology.] *Deutsche Akademie der Luftforschung, Munich, Schriften*, No. 46:85–114, Sitzungsperiode 1939/1940, pub. **1941.** 16 figs., 2 tables, 15 refs. Discussion p. 111–114. **DLC**—Analysis of flight conditions at altitudes from 6000 to 15,000 m is made mainly along the following lines: 1) determination of horizontal wind speed at great heights, 2) cloud formation in the upper troposphere and 3) the appearance of turbulence and of vertical air motion in the upper troposphere and in the stratosphere. Data in tabular and graphic form and schematic diagrams and cross sections are presented. *Subject Headings:* **1. High altitude flying 2. Aeronautical meteorology 3. Upper air data.**—*N.A.S.*

6.11–73 536:629.13

Haber, Fritz, **The heat barrier.** *Scientific American*, 189(6):80–84, Dec. **1953.** 7 figs. **DLC**—If an airplane goes too slow at any given altitude it will not stay aloft—if it goes too

st for its thermal properties it will be too hot for comfort or will deteriorate rapidly. The uses of this are explained and curves showing the thresholds at various Mach numbers peeds) and heights from 0 to 400,000 ft are presented to illustrate vividly the very limited eight and speed range within which flight is possible for various types of vehicles in use at esent (conventional, jets and rockets). One area extends up to 2 Mach numbers and 90,000 , and the other at 25+ Mach numbers and >400,000 ft for rockets which would then be eightless and could glide great distances. How to extend the limits by changes in design, uality of material, etc. of planes or rockets is the problem of aeronautical engineers of today. *ubject Headings:* **1. High altitude flying 2. Heat barrier 3. Rocket design.**—*M.R.*

6.11–74 551.5:629.135.45

International Air Transport Association, Montreal, **Helicopter operation and design equirements. A condensed record of the Symposium on the Operation and Design Requirements of Helicopters,** held during the Sixth Annual Technical Conference of IATA at Puerto ico in April 1953. Montreal, Pub. by IATA, (1953?). 181 p. 4 figs. Its *Doc. Gen.* 1357. **WB**—Among the many other subjects discussed in this symposium report are: 1) probable nge of atmospheric temperature (−20° to 100°F), p. 37–38; 2) cross wind and gust limitaons, p. 62–64 and 3) requirement for meteorological information, p. 64–65. Operating titudes will usually be from 1000 to 2000 ft above terrain. Numerous airline representatives d other interested officials from all parts of the world participated in the exchange of views. *ubject Headings:* **1. Aviation meteorology 2. Helicopters 3. Symposia.**—*M.R.*

6.11–75 532:629.13

Patterson, G. N. et al. (*Inst. of Aerophysics and Dept. of Aeron., Engr., Univ. of Toronto*), **he role of fluid mechanics in aeronautical development.** *Aeronautical Engineering Review*, . Y., 14(2):27–39, Feb. **1955.** 12 figs. **DWB, DLC**—Summary of progress in fluid mechanics n occasion of 50th anniversary of powered flight (1953). Many schematic diagrams are cluded. Applications to aeronautics and jet or rocket flight into the high atmosphere and ter space are discussed in respect to hydrodynamic theory. Work of Institute of Aerosysics is described. It is stated that between 100,000 and 400,000 ft the problems of flight e greatest, for speeds of $M=10$ must be maintained and at that speed aerodynamic heating ould be much too great. Above 400,000 ft a speed of $M=24$ could be maintained without nger to aircraft. Above 150 mi, solar radiation is the most serious factor. Temperature 900°F would occur at 0° angle and 2600°F at 90° angle at speed of 36,000 ft/sec and emisvity of 1. *Subject Headings:* **1. Fluid mechanics research 2. Aeronautical development Outer atmosphere flights.**—*M.R.*

6.11–76 551.5:629.13

Garbell, Maurice A., **Timing of airport traffic control as influenced by weather and aircraft performance.** *Garbell Research Foundation, San Francisco, Garbell Aeronautical Series*, o. 4, Aug. 14, **1951.** 268 p. 77+31 figs., 86 refs., eqs. **DLC**—An extremely elaborate port based on numerous quantitative studies of the effect of meteorological parameters on me of runway occupancy at busy airports (such as San Francisco). Each element, such as r temperature, density, water vapor content, cloud base altitude, visual range, brightness laylight, twilight, darkness), hydrometeors (rain, drizzle, snow, freezing precipitation in r and on ground), wind at various levels, turbulence, vertical motions, dust, sand and electric scharges, is evaluated with respect to aircraft parameters such as rate of climb, airspeed, xi speed, etc. for 7 types of commercial aircraft, taking cognizance of current civil air regulaon in the U.S.A. A wealth of nomograms and diagrams as well as tabular data are included. *ubject Headings:* **1. Airport traffic control 2. Aeronautical meteorology.**—*M.R.*

AGRICULTURAL METEOROLOGY

See also: **Agric. met. bibliog.** (Germany. Deutscher Wetterdienst), **6.11–50.**

6.11–77 551.5:63

[Deij, L. J. L. and Post, J. J.], **Landbouwmeteorologisch onderzoek in de Verenigde taten.** [Agrometeorological research in the United States.] s'Gravenhage, Contactgroep

Opvoering Productiviteit, (1954?) 78 p. 26 figs. (incl. photos), tables, refs. at end of each ch. English summary p. 77–78. At head of t-p: Rapport Studiegroep Landbouw. **DWB**—A report on the practice of agricultural meteorology in the United States based upon three months of travel and study in the United States. The contents of this report include an account of the organization of the U. S. Weather Bureau, the organization of the agricultural extension service, training in agricultural meteorology, the role of the universities in agricultural meteorology research, including the University of Wisconsin, the Earhart Plant Research Laboratory of California Institute of Technology, the Laboratory of Climatology at the Johns Hopkins University, the soil weather project at Raleigh, North Carolina, the research at Davis, California, etc.; the importance of climatology and climatological research in American agriculture; night frost forecasting and preventions (Wisconsin cranberry belt and California citrus region, etc.); the problem of atmospheric pollution; water and wind erosion; water control-irrigation flood control; research on the relationship between weather and plant disease and phenological research. *Subject Headings:* **1. Agrometeorological research 2. U. S. Weather Bureau 3. United States.**—*I.L.D.*

6.11–78 551.509.59:6

Dadyko, V. A., **Iz opyta raboty agrometeostantsii Belogorka (Lenigradskoe UGMS) po obsluzhivaniiu sel'skokhoziaĭstvennykh organizatsiĭ.** [The experience of the Agro-meteorological Station of Belogork (Leningrad Administration of Hydro-Meteorological Service) in serving agricultural organizations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:45 Jan./Feb. **1955. DWB**—The type of meteorological information required by collective farms and machine tractor stations near Leningrad is discussed. The need for forecasting more reliably the occurrence of late frost, for providing meteorological data so as to obtain early yields of potatoes and vegetables and to predict growth of pasture grass in stressed. *Subject Headings:* **1. Agricultural meteorology 2. Agrometeorological forecasting.**—*I.L.D.*

6.11–79 551.5:63:06

Beall, James (*U. S. W. B., Wash., D. C.*), **Good weather ahead? An interview with James Beall by Fred Bailey and Jay Richter.** *Progressive Farmer*, Birmingham, Ala., 69(9) 80–83, Sept. **1954.** port. **DWB**—Remarks, in interview form, by the new head of the agrometeorological section of the U. S. Weather Bureau, regarding drought, climatic changes, cycles, long range and short range forecasts, and the expanding service of the U. S. Weather Bureau to agricultural interests and farmers, especially as affecting the Southern States. *Subject Headings:* **1. Agrometeorological services 2. Forecasting services 3. U. S. Weather Bureau.**—*M.R.*

6.11–80 551.5:63:06

Blanc, Milton L. (*U. S. W. B., Wash., D. C.*), **Commission for Agricultural Meteorology WMO, holds first session in Paris, November 1953.** *American Meteorological Society, Bulletin* 35(3):104, March **1954. MH-BH**—Highlights of the CAgM meeting in Paris are presented in this brief account. The Commission agreed to recommend that the Commission be continued independent of the CCl, rather than merged. All previous IMO resolutions in the field of agrometeorology (except one) were suppressed, and that one continued only in part. Working groups (5) were established on agrometeorological instruction, locust control, agrometeorological observational requirements, effects of weather on farm animals and meteoropathology. Douglas H. K. Lee, H. C. S. Thom, and Max Kohler of the U. S. A. were assigned to these working groups. *Subject Headings:* **1. WMO. Commission for Agricultural meteorology 2. WMO conferences.**—*M.R.*

6.11–81 551.5:63

Kulin, István, **Az agrometeorológia a Szovjetunióban és hazánkban.** [Agricultural meteorology in the Soviet Union and in Hungary.] *Időjárás*, 58(1):1–7, Jan./Feb. **1954.** Russian and French summaries p. 1. Also his: **Az agrometeorológia időszerű kérdései.** [Current problems in agricultural meteorology.] *Ibid.*, 58(3):153–158, May/June **1954. MH-BH**—Extensive discussions have been included in the Russian periodical **Meteorologiia i Gidrologiia** on problems of agrometeorological research. The discussions were initiated in

935 and came to a close in a widely attended symposium held by the Hydrometeorological ervice in 1952. The author reviews the principal results deduced from the discussions, specially as far as they are applicable to Hungary. He also describes the progress achieved n Hungary during the past few years in arranging existing meteorological data for agricultural urposes (precipitation distribution and frequencies, sunshine duration, frost frequencies, etc.) nd investigating the relationship between meteorological factors and plant development. uture plans (erection of an agrometeorological research establishment, etc.) are discussed. *ubject Headings:* **1. Agricultural meteorology 2. Progress in meteorology 3. Hungary U.S.S.R.**—*G.T.*

6.11–82 551.5:63

Berényi, Dénes, **Az időjárás és a mezögazdasági termelés a mai tudomány tükrében.** Weather and farm production as reflected in modern science.] *Időjárás*, 57(2):65–80, Iarch/April **1953.** 19 figs. Russian and French summaries p. 65. **DLC**—Among various iodern methods of agricultural meteorology, correlation computation serves the purpose of etermining the dependence of crop amounts on weather factors. The optimum sowing ate can be determined by investigating soil temperature variations. The experiments escribed in this paper show that proper orientation of furrows and soil temperature control chieved by various types of covers will increase crop amounts considerably. *Subject Headings:* **Agricultural meteorology 2. Crop yield.**—*Trans. of author's abstract.*

6.11–83 551.586:63

†Thornthwaite, C. W. and Mather, J. R. (*both, Johns Hopkins Univ.*), **Climate in relation o crops.** *Meteorological Monographs*, Boston, 2(8):1–10, Oct. **1954.** 3 figs., 3 tables, 32 refs. **IH-BH**—The history of studies on the relationship between temperature and plant growth nce Reamur introduced the concept of temperature summation and the inadequacy of the rdinary meteorological statistics, particularly of temperature, are reviewed. The refinement f the "heat unit" concept by Thornthwaite and its application to crop scheduling is outned. The nature of the concept of potential evapotranspiration, its investigation up until 955 at the Johns Hopkins University Laboratory of Climatology at Seabrook, N. J., and the pplication of this concept to scheduling the harvesting of peas and other plants and to schedulng irrigation are discussed. *Subject Headings:* **1. Climatic influences 2. Crop ecology 3. Evapotranspiration 4. Agricultural meteorology.**—*I.L.D.*

6.11–84 551.588.1:633.2:547.21

Grunow, J. (*Hohenpeissenberg Met. Obs.*), **Geländemeteorologischen Einflüsse auf den Carotingehalt der Futterpflanzen und das Entstehen von Mangelkrankheiten.** [Local limatic influences upon the carotene content of fodder plants and the origin of deficiency iseases.] *Die Heilkunst*, Munich, 67(8):266–274, Aug. **1954.** 9 figs., 16 refs. Abstracted rom reprint. **DWB**—In connection with a study of the incidence of goiter in two adjacent Bavarian villages, an investigation was carried out on the relationship between the vitamin A content of milk fat and atmospheric temperature, relative humidity, precipitation, cloudiness, lear days and insolation. Studies during 1952 and 1953 indicate that warm weather characterized by bright, sunny days increased carotene formation; this effect manifested itself fter a latency period of 15–25 days. The effect of air temperature, soil temperature, global adiation in combination with different exposures upon the carotene content of fodder plants s analyzed. *Subject Headings:* **1. Climatic influences 2. Carotene content of plants.**—*I.L.D.*

FOREST METEOROLOGY

6.11–85 551.509.58:632.187

Ayer, H. S., **Critique on fire-weather forecasting at Olympia, Washington during the 1952 eason.** U. S. Weather Bureau, Olympia, Washington, Feb. 5, **1953.** 14 p. Typescript. **DWB**—Verification scores on humidity forecasting for 1952 are prepared for each of 21 forecast ub-districts in the State of Washington and for each of 2 individuals, plus the overall seasonal verage error. A classification of the dominant causes of error on poor forecast days is made,

followed by a discussion of several local circulation effects contributing thereto. Average error for entire state was 4.4% compared with 5.4% in 1951. *Subject Headings:* **1. Fire weather forecast accuracy 2. Humidity forecasting 3. Washington.**—*Author's abstract.*

6.11–86 551.509.58:632.187

Byram, George M., **Atmospheric conditions related to blowup fires.** *U. S. Forest Service. Southeastern Forest Experiment Station, Ashville, N. Carolina, Station Paper*, No. 35, April **1954.** 31 p. 13 figs., table, 6 refs. **DWB, DLC**—An exceedingly interesting study of a number of "blow-up" fires which have occurred in various parts of the U.S.A. in the past 15 years. Wind profiles from pilot balloon or radiosonde observations are presented for each case and the conclusion drawn that a certain type of profile is an important factor in relation to these rare "blow-up" conditions. If fuel is dry, humidity low and wind strong just above tree-top level, decreasing rapidly for several thousand feet to provide the possibility for a convective "chimney" to develop, the amount of turbulent energy will be sufficient to allow a small fire to spread with explosive speed. A jet stream may be present above the convective layer. Case histories are given in detail and forecast rules promulgated. The amount of turbulence present can be determined by airplanes as well as balloons. *Subject Headings:* **1. Fire weather forecasting 2. Fire danger rating 3. Wind profiles 4. United States.**—*M.R.*

6.11–87 551.5:634.9:632.187

Demmon, E. L., **Forest research in the southeast.** *U. S. Forest Service. Southeastern Forest Experiment Station, Asheville, N. Carolina, Station Paper*, No. 13, Nov. **1951.** 11 p. **DWB**—Among the types of forest research conducted in the 5 southeastern states from Virginia to Florida are: fire danger rating, hydrologic research, and relation of rainfall to amount of water actually used by trees (evaporation, runoff, etc. being considered). Seven research centers include the Coweeta Hydrologic Laboratory in western N. Carolina (established 1933), the Calhoun Experimental Forest in the central Piedmont of S. Carolina, and the Francis Marion National Forest near Charleston, S. C. (where fire behavior is studied). *Subject Headings:* **1. Forest meteorology 2. Fire weather studies 3. Southeastern United States.**—*M.R.*

6.11–88 551.5:632.187

Keetch, John J., **Instructions for using forest fire danger meter type 8.** *U. S. Forest Service. Southeastern Forest Experiment Station, Station Paper*, No. 33, Jan. **1954.** 7 p. forms. **DWB, DLC**—Effective Jan. 1954, fire danger meter 8-W supercedes types 5-W and 5-0 in use in U. S. Forest Service Region 7. Like the types previously used, this meter consists of concentric discs with scales accounting for fuel moisture, wind velocity, 24-hr rainfall, and condition of the lesser vegetation. The meter yields burning-index values up to 200 (as opposed to 100 on earlier models). The other changes are: (1) 5 instead of 3 settings for condition of vegetation and (2) a "Build-up Index" disc which replaces the type 5 meter's discs for season and quantity and time of last rain. *Subject Heading:* **1. Fire danger rating meter.**—*G.T.*

6.11–89 551.5:632.187

*Mitchell, J. A., **Burning index ratings in fire control planning.** *U. S. Forest Service. Lakes States Forest Experiment Station, Station Paper*, No. 28, Nov. **1953.** 13 p. 4 figs., 4 tables. **DWB**—Since 1936 the severity of burning conditions has been rated daily for the Chippewa National Forest on a 100 point scale, with 0–1 as safe and >50 as extremely dangerous. The records for 1936–1951 are summarized in this report to show the frequency of days with various degrees of danger compared with actual number of fires, area burned, size of fires, etc. and the percent of days in each class on which fires occurred (0.5% for 0–1, and 66% for >50). Seasonal variations are also shown in tables and charts. Considerable variations also occur from year to year as is shown by the annual frequency for each class interval. The standard deviation of the average is used to provide adequate protection 5 years out of 6. *Subject Headings:* **1. Fire weather 2. Fire danger rating 3. Chippewa National Forest, Minn.** —*M.R.*

6.11–90 551.5:632.187

*Turner, J. A., **Intense drying periods over the southern coast of British Columbia.** *nada. Meteorological Div., CIR-2316*, TEC-154, June 25, **1953.** 8 p. 4 refs. **DWB**—ean 1230 GMT sea-level charts indicate that the relatively intense summer dry spells of e southern British Columbia coast are associated with high pressures along the Continental ivide, with a trough extending up the coast from California. Mean 500 mb charts indicate dge conditions along the coast. Maximum relative humidities at one station on the coast, ove the influence of nocturnal inversions and marine effects, can be shown to be a function the position of the center of a high pressure cell located in the vicinity of the Continental ivide. The synoptic conditions leading up to the development of the drying cycle have en indicated briefly. The problem of forecasting the end of such spells, particularly in the tumn, has not been attempted, but does merit more research. *Subject Headings:* **1. Fire eather studies 2. Dry periods 3. British Columbia.**—*Author's abstract.*

6.11–91 551.594.22:632.187

U. S. Forest Service, **Report of the Chief of the Forest Service, 1952. America's state world forestry. 1952.** 64 p. p. 31–33, **Fire control;** p. 48–49, **Research in forest fire ntrol. DWB**—In the statistics for the year 1951, the fact is mentioned that a single lightning orm caused 565 fires in Aug. in northern California—the largest concentration of fires from single storm ever recorded. *Subject Headings:* **1. Forest fire statistics 2. Lightning fires California.**—*M.R.*

BUILDING DESIGN

6.11–92 551.582.3:72

*Thomas, Morley K. (*Toronto Met. Div.*), **Climatological atlas of Canada.** A joint publica- n of the Division of Building Research, National Research Council, and the Meteorological vision, Department of Transport, Canada. National Research Council of Canada. Div. Building Research, D.B.R., No. 41, Dec. **1953.** 253 p. tables, numerous charts and graphs, refs. Price: $2.00. *National Research Council of Canada, N.R.C.* No. 3151. **DWB**—arts and tables of meteorological conditions all over Canada (44°–80°N) are presented r use in other fields as well as in building research. Major elements included are: Winter esign Temperature, Summer Design Temperature, Humidity, Wind, Snow, Rain, Sunshine, rmafrost, Earthquakes and "Hythergraphs." Design temperatures are on a 1, 2½, 5 and % basis, and are based on hourly temperatures at 35 locations in Canada. Wind data clude computed max. gust speed, mean seasonal wind speed and direction frequencies of nds. Snow includes max. depth on ground, max. snow, frost, mean annual and monthly owfall. Isolines are in blue on an orange base, and represent means or frequency categories. *bject Headings:* **1. Climatic atlases 2. Building design data 3. Canada. I. National esearch Council of Canada.**—*M.R.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Snow and avalanches in winter** (Davos, Switzerland. Eidgenössisches Inst.), 6.11–4; **Manual of surface observations** (U. S. W. B.), 6.11–9; **In center of Arctic** (Vodop'ianov), 6.11–25; **Exploration of earth's upper atmos.** (Brunt), 6.11–118; **Ambient temp. determinations** (Minzner et al.), 6.11–120; **Indexing of weather stations** (Hajosy), 6.11–296.

6.11–93 551.501:551.55 551.508.59

Schotland, R. M., **The measurement of wind velocity by sonic means.** *Journal of Me- rology*, 12(4):386–390, Aug. **1955.** 4 figs., 6 refs., 11 eqs. **DWB**—The theory of wind easurement by sound waves is set out. The phase shifts or transit times are functions of rectangular components of velocity, but the error introduced by regarding the phase shift a function of a single wind component is calculated. An instrument is described (for face winds) in which a wave generated by a group of loud speakers equivalent to a pulsating

sphere is picked up by oriented phase-detecting microphones, and presented by a meter cathode-ray tube. The three components can each be measured within 1%. *Subject Headings:* **1. Sonic wind measurement 2. Sonic anemometers.**—*C.E.P.B.*

6.11–94 551.501.42:551.509.3

Mazumdar, S. (*Met. Office, Alipore, Calcutta*), **Barometric tendency equation for a atmosphere of finite extent.** *Indian Journal of Meteorology and Geophysics*, 5(1):78–7 Jan. 1954. 10 refs. **MH-BH**—The tendency equation is expressed in a different form fro that of Godson (1948), Matthewman (1946), and Houghton and Austin (1946). contains a term $\delta H/\delta t$ so that it is called the "oscillational" or tidal term, which is evaluate by considering the atmosphere as built up of specific layers of known limits and characte istics. *Subject Headings:* **1. Barometric tendency equation. I. Houghton, H. G. II. Austi J. M.**—*M.R.*

6.11–95 551.501.4

*Clapp, Philip F. and Marcus, Sidney O., Jr. (*Ext. Forecast Sect., U. S. W. B., Wash D. C.*), **Revised tables for spherical vorticity trajectories.** U. S. Weather Bureau, Oct. 195 3 p. tables, ref. Reproduction of typescript. **DWB**—The previously published table of amplitude and quarterwavelengths for constant absolute vorticity trajectories in a spheric earth by the Bureau of Aeronautics, Project AROWA are extended to latitude 75°. Th tables contain the initial data necessary for computing trajectories, namely latitude, win speed and wind direction from east, all measured at the inflection point. And the data ar arranged in the same manner as in the original tables. The method for computing the tra jectories is described. *Subject Headings:* **1. Computation tables 2. Spherical vorticity tra jectories.**—*I.L.D.*

6.11–96 551.501.45:551.506.3:517.512.

Jenkinson, A. F., **Estimation of meteorological averages for other months given averag values for January, April, July and October.** *Meteorological Magazine*, London, 83(981):74–75 March 1954. 5 tables, eq. **MH-BH**—Given values of a meteorological element for fou equidistant months or four seasons, factors are given for computing values for all individua months. *Subject Heading:* **1. Methods of computation.**—*C.E.P.B.*

6.11–97 551.501.7:551.557:629.1

Hurst, G. W., **Wind derivation from vertical photographs.** *Institute of Navigation London, Journal*, 8(3):250–255, July 1955. 5 figs., 3 tables, ref. **DWB**—Gives method o computation of wind from overlapping photos of the ground from an aeroplane flying straigh and level at known air speed and height. A flight near Aldergrove (N. Ireland), used as ar example, is compared with radiosonde winds. Sources of error are discussed. *Subject Head ing:* **1. Upper air wind computations.**—*C.E.P.B.*

6.11–98 551.501.7:551.547:551.508.822

Johnson, D. H., **Diurnal and interdiurnal variations of the measured heights of pressure surfaces.** *Great Britain. Meteorological Research Committee, M.R.P.* 888, Nov. 12, 1954 8 p. 10 figs., 3 tables, 4 refs. Mimeo. **DWB**—Observed diurnal variations of 700, 500, 300 200 and 100 mb heights were computed for Malta and Nicosia (3–15–3 h) and for Larkhill and Lerwick (3–9–15–21–3 h). These are compared with radiation errors read from new graphs for M.O. radiosondes at solar altitudes 70 to −5° up to 20 km. The observed and computed variations are mostly similar; differences are attributed to neglect of sky radiation. Smoothed "observed" curves are drawn for use in correcting 6 and 12 h synoptic height tendencies for diurnal variation. *Subject Headings:* **1. Radiosonde errors 2. Relative topography.**—*C.E.P.B.*

6.11–99 551.501.7:551.451:551.557

Pothecary, I. J. W. and Murgatroyd, R. J., **The use of aircraft to measure wind shear by observation of vertical smoke trails.** *Great Britain. Meteorological Research Committee, M.R.P.* 810, May 14, 1953. Mimeo. 6 p. 5 figs., table. **DWB**—Describes trails

a smoke generator falling vertically from an aircraft, producing a trail 5000 ft long which observed and photographed from a second aircraft. Examples are shown and analyzed and nprovements suggested. *Subject Headings:* **1. Upper air wind investigation 2. Wind shear.** *C.E.P.B.*

6.11–100 551.501.7:551.557

Reed, Jack W. (*Sandia Corp., Albuquerque, N. M.*), **The representativeness of winds-oft observations.** *American Meteorological Society, Bulletin*, 35(6):253–256, June **1954.** figs., 2 tables, 6 refs. **MH-BH**—In order to evaluate the significance of limitations placed inherent turbulence upon attempts to measure atmospheric structure, the author employed technique by means of which "minimum errors introduced by this turbulence limitation ay be approximated by subtracting known instrumental variations from the total deviations a large number of observations from their mean over a representative period of time." using radar winds accurate to ±2 fps the hourly turbulence wind variation is found to be pproximately ±6 fps. Optimum procedures for observing and forecasting accuracy are escribed. *Subject Headings:* **1. Representativeness of observations 2. Winds aloft 3. At-ospheric turbulence.**—*Based upon author's abstract.*

6.11–101 551.501.7:551.553

Vilkner, Hans, **Die vektorielle Behandlung des Windes, I, Bildliche Darstellung des indes im zeitlichen Ablauf.** [Vector computation of wind, pt. 1, Graphical representation wind versus time.] *Zeitschrift für Meteorologie*, 7(7):193–208, July **1953.** 15 figs., 8 tables, refs. **MH-BH**—The customary representations of wind speed and direction are illustrated two examples, namely, the wind for a month and for two days; and their inadequacies are inted out. Two possibilities suggested for representing wind direction and intensity by eans of a single curve include (1) an accentuated wind direction curve which is either light heavy depending upon the wind intensity and (2) a colored wind intensity curve in which e wind direction is placed below the wind intensity in different color combinations. The ctor method can be used to represent either the wind path or wind displacement by means vectors of varying length, depending upon wind velocity, or the wind direction by vectors equal length (without considering intensity). The latter method is described and illustrated specific examples. *Subject Headings:* **1. Wind computation 2. Wind vector computations.** *I.L.D.*

6.11–102 551.501.8:551.506:551.557

*Kessler, Edwin, III, (*M.I.T., Cambridge, Mass.*), **Curvature corrections for radiowind ports.** *American Meteorological Society, Bulletin*, 35(7):328–330, Sept. **1954.** 2 figs., ble, 2 refs., 5 eqs. **MH-BH**—The errors arising from the neglect of the curvature of the rth in the reduction of wind data from modern radio direction finding equipment are discussed iefly. Data are presented which enable significant corrections to be made to certain wind ports of interest to the synoptic meteorologist and flight forecaster. *Subject Headings:* **Radio wind data 2. Curvature corrections.**—*From author's abstract.*

6.11–103 551.501.8:621.396.029.6

Rabenhorst, Helmut, **Messung der dielektrischen Eigenschaften aus dem Hauptein-llswinkel und dem wiederhergestellten Azimut für Wellenlängen unterhalb 3 cm.** [Meas-ement of dielectric properties from the principal angle of incidence and the azimuth of nission for wave lengths under 3 cm.] *Annalen der Physik*, 6th Ser., 16(3/4):163–175, **1955.** figs., 2 tables, 14 refs. **DLC**—The difficulties of measuring dielectric properties with the lp of conducted waves under 3 cm can be avoided when the measurements are carried out in ree radiation field. As the microwave-rich waves radiated from the antennas are generally early polarized, methods which assume polarized waves are especially favorable. These ethods include measurement of the optical constants n' and k, i.e., the electrical magnitudes and ϵ'' from the principal incidence angle and the emitted azimuth. For 2.5 cm waves a ethod of measurement with metallic retarded lens as emittor (polarizator) and receiver nalyzer) is described; some measurements are carried through and sources of error of the paratus discussed. *Subject Heading:* **1. Microwave techniques.**—*Transl. of author's abstract.*

6.11–104 551.501.81:551.51

Harrison, Henry T. (*United Air Lines*), **Highlights of United Air Lines weather rad evaluation.** *Weatherwise*, 7(4):92–95, Aug. **1954.** 13 figs. (incl. photos). **MH-BH**—I scribes and illustrates weather mapping radar installation (5.5 cm) used by United Air Li in 1953, and nicknamed "Sir Echo." From June through Sept. 1954, 40 flights with t equipment were made (133 hours of flying, 80 of which were in thunderstorm areas) usi Denver as a base. Much hail, 5 tornadoes, and 4 "cloudbursts" were included in conditio covered by radar mapping. It was found that a pilot can detour a storm after spotting at a distance of over 75 miles with minimum loss of flight time; can choose a corridor of le turbulence or thunderstorm activity with detours of 5 mi or less, and can give valuable formation to planes not thus equipped. Other advantages are cited. *Subject Headin* **1. Air-borne radar 2. Thunderstorm avoidance 3. United Air Lines, Inc.**—*M.R.*

6.11–105 551.501.81(689.

Soane, Christine M. and Miles, V. G., **On the space and time distribution of showers ir tropical region.** *Royal Meteorological Society, Quarterly Journal*, 81(349):440–448, July 195 5 figs. **DWB**—Radar precipitation echoes over 100 mi round Salisbury, S. Rhodesia, we recorded by photographing PPI screen at 8 sec intervals. Two types occur: large are of weak echo with stratus, and small sharp areas of strong echo with cumulus. No relati was found to synoptic situation. Cumulus type forms bands of discrete echoes, over 150 long, drifting in one direction. Life time of most individual echoes was less than 1 hr. Th tend to occur on lee side of ridges. There is no obvious relation to upper winds. Weath at Salisbury when a raincloud passed overhead is described. *Subject Headings:* **1. Rad analysis of showers 2. Rainfall structure 3. Southern Rhodesia.**—*C.E.P.B.*

6.11–106 551.501.83:551.594

*Bowe, P. W. A. (*Cavendish Lab., Cambridge*), **A study of individual radio atmospheri received simultaneously at two places.** *Philosophical Magazine*, London, 44(355):833–84 Aug. **1953.** 4 figs., 3 tables, 4 refs. **DWB**—A previous paper (Bowe 1951) described a meth of studying the propagation of radio waves of frequency 2 kc/s to 10 kc/s over the surfa of the earth, by observing the responses of narrow-band receivers to individual radio a mospherics. The present paper describes an extension of these observations in which t same method was used simultaneously at two places, Cambridge and Aberdeen, 550 km apar The narrow band receivers at both places were tuned to frequencies 7.5, 5.0, 3.5 and 0.6 kc/ By comparing the responses at the two places, the attenuation factors for each frequen could be found. The sources of the atmospherics were located by the 'Sferic' direction findi system of the Meteorological Office, supplemented by a direction finder at Cambridge. Mo of the observations were made at about noon. The results are presented as tables giving t propagation factor for 1000 km path, for the four frequencies studied. It was found th waves of frequency 0.6 kc/s are less attenuated than waves of frequency 3.5 kc/s. The resul for 7.5 and 5.0 kc/s appear to indicate that the attenuation is less in winter than in summe *Subject Headings:* **1. Radio wave propagation 2. Sferics 3. Sferics sources 4. Cambridg England 5. Aberdeen, Scotland.**—*Author's abstract.*

6.11–107 551.501.89:551.594.5

†Booker, H. G., Gartlein, C. W. and Nichols, B. (*Cornell Univ.*), **Interpretations of radi reflections from the aurora.** *Journal of Geophysical Research*, 60(1):1–22, March 195 17 figs., 31 refs., eq. **DWB**—The literature on radio echoes from the aurora is reviewed an results obtained at Ithaca, N. Y., College, Alaska and Saskatoon and from analysis of radi signals transmitted from Cedar Rapids, Iowa, are analyzed. Diurnal and seasonal variations i auroral reflections correspond with frequency of auroras; maximum before and after midnight minimum during daylight and at midnight; and, respectively, maximum at equinoxes (es pecially spring equinox), and minimum at solstices (especially winter solstice). Results o both pulse and continuous radio transmissions at 2.4 to 144 Mc/sec show fine structure, azimut (always to N), fading time (proportional to frequency), which is much faster than would b expected and give clue to cause of above phenomena. Reflections are due to scattering fro numerous ionized columns as in meteor trail reflections but with faster motion. Theory o

round reflection (HARANG) rejected. *Subject Headings:* **1. Radio echoes from auroras . Auroral effects on radio propagation.**—*M.R.*

OBSERVATIONAL DATA

See also: **Ceiling and visibility statistics** (Uruguay. Serv. Met.), 6.11–70; **Estimation of meteorological averages** (Jenkinson), 6.11–96; **Curvature corrections for radiowind reports** (Kessler), 6.11–102; **Monthly mean pressure charts** (S. Africa. Weather Bur.), 6.11–113; **Determining winter design temps.** (Thomas), 6.11–231; **Climatic data** (Austria. Zentralanstalt für Met. und Geodynamik), 6.11–334; *see also* special bibliography on **Cooling Power and its Measurement, p. 1622.**

6.11–108 551.506.1(43)(058)

*Germany. Deutscher Wetterdienst, **Deutsches Meteorologisches Jahrbuch, 1944, Teil , Monats- und Jahresergebnisse.** [German Meteorological Yearbook, 1944, v. 2, Monthly nd yearly summaries.] Bad Kissingen, **1955.** 116 p. almost entirely tables, diagr. (fold.) **WB**—This yearbook contains monthly summary data for 7500 2nd and 3rd order stations in ermany arranged by provinces. An alphabetical station list gives coordinates, observer, eriod of record, and index of general types of data available (temperature, humidity, wind, sunine, pressure, soil temperature, sun and sky radiation). For financial reasons this volume 1944), in comparison with that for 1937, has been abridged. It is the last volume which overs all of Germany. From 1945 to 1953 the yearbooks are published by occupation zones. For 1939, *see* 5.3–58, March 1954; for 1940, *see* 3.1–32, Jan. 1952; for 1942, *see* 5.3–59, March 954, *MAB.*) *Subject Headings:* **1. Annual meteorological reports 2. Monthly climatic data Yearbooks 4. Germany.**—*M.R.*

6.11–109 551.506.1(43)(058)

*Germany. Deutscher Wetterdienst, **Deutsches Meteorologisches Jahrbuch, U. S. Zone 952. I. Tägliche Beobachtungen: phanologische Ergebnisse. II. Monats- und Jahreserebnisse. III. Niederschlags-beobachtungen. IV. Tabellarische Übersicht der aerologischen ufstiege.** [German Meteorological Yearbook, U. S. Zone 1952, Pt. 1, Daily observations: henological results. Pt. 2, Monthly and annual results. Pt. 3, Precipitation observations. t. 4, Tabular synopsis of aerological ascents.] Bad Kissingen, **1954.** 200 p. mostly ables. **DWB**—This edition of the German Meteorological Yearbook in the U. S. Zone ncludes the daily observations of three stations, daily totals of sunshine duration at 24 stations, henological observations at 200 stations, monthly and annual observations of 116 first order tations, a selection of sunshine and soil temperature observations, frost and snow cover limits, etailed precipitation data in the U. S. Zone and aerological data. The form and content f this volume resemble those of the preceding volumes. *Subject Headings:* **1. Observational ata 2. Yearbooks 3. West Germany.**—*I.L.D.*

6.11–110 551.506.1(612)

*Libya. Meteorological Service, **Weather Bulletin.** No. 1, June **1954**— Latest issue een, No. 8, Jan. **1955.** about 6 p. each. monthly, tables. Mimeo. Replaces **Bulletins** reviously issued by the Meteorological Section of the Department of Agriculture of the ripolitanian Administration. Issued from Tripoli. **DWB**—This new bulletin, which will e expanded to include meteorological information from the provinces of Cirenaica, Tripolitania nd the Fezzàn, gives a summary of the synoptic conditions over Northwest Africa, as well as summary of temperature, relative humidity, cloudiness, winds, rainfall, dew, and tabular ata for 60 stations in the various regions; temperature means and extremes, relative humidity t 08 h and 14 h, and rainfall for month and season (Sept. 1 to date), and maximum in 24 hrs. color map shows isohyets for month. *Subject Headings:* **1. Monthly data bulletins 2. Libya.** -*M.R.*

6.11–111 551.506.1(469)

***Oporto, Portugal. Universidade do Porto. Instituto Geofísico, **Boletins mensais e esumo anual.** [Monthly bulletins and annual résumé of the Serra do Pilar Observatory.] 927(?)— Latest issue seen, 1953. (1953 issue), 68 p. mostly tables. **DWB**—Contains

hourly, 3 hourly, thrice-daily or daily, and monthly and annual data on weather, visibilit pressure, temperature, relative humidity, vapor pressure, wind speed, precipitation, evaporatio soil temperature, cloudiness, direct and diffuse solar radiation, pressure, temperature, relati humidity, wind speed and duration, and rainfall for each of 16 directions of wind for eac month. Soil temperatures are given for surface, 30, 40, 60, 90 and 150 cm depth. Hydr meteors are also given for each 6 hourly period of each day, and cloud types for each 3 hour *Subject Headings:* **1. Annual meteorological reports 2. Observational data 3. Monthly da bulletins 4. Oporto, Portugal.**—*M.R.*

6.11–112 551.506.1(497.1

*Slovenia. Hidrometeorološke Službe, **Letno poročilo, 1953.** [Annual Report, 1953 Ljubljana, **1954**(?) 46 p. graphs. mostly tables. **DWB**—Daily or thrice-daily meteorologic data are given *in extenso* for Ljubljana, and summarized data for each month and for the year f 68 other stations in Slovenia. A station location chart and list of stations, phenological char and data, and hydrological data (water levels, runoff and water temperatures) are also include Usual surface observational data are presented for all stations. In addition, visibility, clou cover, vapor pressure and minimum temperature 5 cm above ground are given for Ljubljan In 1953 there were 11 synoptic, 58 second-order stations, 267 rainfall stations, 120 phenologic stations and 211 river gaging stations in Slovenia. *Subject Headings:* **1. Annual meteoro logical reports 2. Phenological summaries 3. Yugoslavia.**—*M.R.*

6.11–113 551.506.1:551.513:551.5

*[South Africa. Weather Bureau.] **Southern Hemisphere Project of the Weathe Bureau, South Africa. General information regarding the tables, diagrams and chart published in Notos.** Its *Notos*, 3(1):22–96, **1954.** 2 maps, tables, diagrs., charts. **DWB**— The daily pressure data are given now for most of the Southern Hemisphere at 0600. with the exception of the South American sector (275°E to 325°E) where the observation at 1200Z are used. The preparation of monthly mean charts for 1000, 500 and 1000–500 m is explained; these are still based on a rather sparse network of stations, especially over th Pacific. Selected circulation indexes are published. *Subject Headings:* **1. Pressure dat 2. Monthly mean pressure charts 3. Circulation indexes 4. Southern Hemisphere.**—*A.A.*

6.11–114 551.506.1(496

*Turkey. Devlet Meteoroloji Işleri Umum Müdürlügü, **Yillik Meteoroloji Bülteni** [Annual Meteorological Bulletin,] Vol. 1, No. 1, Nov. 1925, pub. **1933.** Latest issue seen Vol. 25, 1949, pub. **1952.** Annual. numerous tables. 1925–1934 published by Turkey Meteoroloji Enstitüsü, Ankara. Title varies: 1925–1934 as **Türkiyede Meteoroloji Rasatlari** 1935–1937 as **Meteoroloji Rasatlari.** Early volumes also have German subtitle "**Monatliche Witterungsübersichte.**" Vol. 1–4, 1925–1928 issued monthly. Vol. 5, 1929— annual **DWB, DLC**—These voluminous annual reports contain all of the available observationa data for synoptic stations (such as Ankara) for each fixed observation hour as well as the daily and monthly totals, frequencies and other data on rainfall from pluviometric stations and phenological data from the agrometeorological network; summary tables are also given fo second order stations. *Subject Headings:* **1. Annual meteorological reports 2. Climatic data 3. Turkey.**—*M.R.*

6.11–115 551.506.2(41/2):551.547.3 551.506.2(41/2):551.586:631.5

Royal Meteorological Society, **Discussion on "The weather of 1954."** Its *Quarterly Journal*, 81(349):499–514, July **1955.** Contents: Glasspoole, J., **The weather of 1954 over the United Kingdom,** p. 499–504. 3 figs., table, 4 refs. Forsdyke, A. G., **Weather of 1954 in relation to Northern-Hemisphere circulation patterns,** p. 504–507. 2 figs. Penman, H. L., **Weather and farming, 1954,** p. 507–511. 4 tables. **Discussion** p. 511–514. **DWB**—Glass-POOLE set out monthly rainfall, temperature and sunshine and percent or departure from average, for England and Wales, Scotland, and N. Ireland in 1954, and charts for year. Practically the entire country was rainier, cooler and cloudier than normal. Forsdyke said the bad weather was mostly limited to the neighborhood of the British Isles, and was due to persistent anomalies of 1000–500 mb thickness and of pressure (below normal Feb.–

larch and June through Nov.). In summer pressure was persistently low. PENMAN summarized progress of field work, grain, grass, potatoes and sugar beet in each month; a story of delay and disease. Yields per acre were less than in 1953 though above average for 1944–53. In the discussion various suggestions as to causes of the bad summer were put forward. R. C. MAINEY discussed the origin of the locusts which reached Scotland in October, the first since 1869. *Subject Headings:* **1. Weather anomalies 2. Crops 3. British Isles.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **Rocket meas. of upper atmos. density** (Smith et al.), 6.11–163; **Recording of areal cloudiness distribution** (Khalevitskiĭ), 6.11–293.

6.11–116 551.507.362:77

Baumann, R. C. and Winkler, L., **Photography from the Viking 11 rocket at altitudes ranging up to 158 miles.** *U. S. Naval Research Laboratory, Rocket Research Report,* No. 18; *NRL Report,* No. 4489, Feb. 1, 1955. 8 p. 3 refs., table, 14 photos. **DWB**—On May 24, 1954, Viking 11 was launched at White Sands Proving Ground, New Mexico. The research equipment in the rocket included an aircraft camera, which took 39 pictures at altitudes varying from 65 mi on the ascent, through the peak of 158.4 mi, to 33.3 mi on the descending portion of the trajectory. Great care in focusing the camera lens produced photographs with excellent definition. A wiring difficulty caused the camera to operate in an irregular sequence, so that the time and altitude of a picture could not be established from telemetered flight data. The altitude at which the first few pictures were taken was calculated from the photos, using the focal length of the camera lens, contour maps of the area, and the rocket subpoint. After the first pictures were correlated with their timing pulses by calculations, the remainder were correlated by measuring the difference in distance between two points as they appeared in successive pictures. The 10 photos included in this report show the area near White Sands and interesting features of the earth's surface, cloud formations, and the atmospheric layer at the horizon. *Subject Headings:* **1. V-11 rockets 2. Rocket photography 3. White Sands Proving Ground, New Mexico.**—*Authors' abstract.*

6.11–117 551.507.362

Berning, Warren W. (*Ballistic Res. Labs., Aberdeen Proving Ground, Md.*), **Trajectory measurements for rockets used in upper atmosphere research.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, 1954. p. 65–72. 8 figs.) **DWB**—The various forms of optical and electronic instrumentation employed at the White Sands Proving Ground, New Mexico, for the tracking of high-altitude rockets are briefly described. Included in the descriptions are indications of their respective instrumental precision and their application to the upper atmosphere rocket research program. *Subject Headings:* **1. Rocket tracking 2. Upper atmosphere research—.** *Author's abstract.*

6.11–118 551.507.362:551.501.7:061.3

Brunt, Sir David, **Exploration of the earth's upper atmosphere using high-altitude rockets: British research programme.** *Nature,* London, 176(4476):282–283, Aug. 13, 1955. **DWB**—The British program (part of International Geophysical Year) is to explore, by rockets carrying 100 lb of scientific instruments to a height of 120 mi or more, temperature and density, and nature of ionosphere and to search for meteoric dust and source of night airglow. *Subject Headings:* **1. Rocket investigations 2. International Geophysical Year 1957–1958.**—*C.E.P.B.*

6.11–119 551.507.362

Hammond, Rolt, **Rockets for atmospheric research.** *Instrument Practice,* 9(5):427–430, May 1955. 2 figs., 4 refs. **DLC**—History of German war rockets and White Sands rockets, and results obtained with the latter, are set out. The thermionic and alphatron ionization gages are illustrated. The Aerobee and "rockoon," and methods of measuring temperature and wind velocity by sound waves, are described. *Subject Headings:* **1. Rockets Rockoons.**—*C.E.P.B.*

6.11–120 551.507.362:551.501.

Minzner, Raymond A.; Dubin, Maurice and Beth, Eric W. (*U. S. A. F. Cambridge Res Center, GRD, Mass.*), **Ambient temperature determinations from yawing rockets in the presenc of winds.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploratio of the upper atmosphere.** London, Pergamon, **1954.** p. 17–26. 3 figs., 6 refs., 36 eqs. **DWB**—Two physical measurements on the wedge shaped or conical surface of a rocket an trajectory data determine two kinds of ambient temperature and limited wind informatio In the absence of winds, the method does not require isentropic flow conditions and is therefor independent of the geometry of the rocket. With a knowledge of aspect, the method may b extended to the measurement of the complete wind vector. A description of a plausibl instrumentation for measurement of the required quantities is also presented. *Subject Head ing:* **1. Rocket observation techniques.**—*Authors' abstract.*

6.11–121 551.507.362:551.510.5

O'Day, Marcus D. (*U. S. A. F. Cambridge, Res. Center, Mass.*), **Upper air research b use of rockets in the U. S. Air Force.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W (*eds.*), **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 1–10 ref.) **DWB**—This programme which started seven years ago with the primary emphasis o engineering problems has now evolved to the point that it is almost entirely an investigatio into the properties of the upper atmosphere. The main experimental techniques have bee developed and the experience of rocket instrumentation shared with a large number of researc groups. The use of the sunseeker will make possible many precise radiation investigations The solar observatory with its 16-in. coronograph is in operation near the launching sites The Aerobee rocket is developed to the point where it will carry equipment into the lowe ionosphere and the recovery techniques perfected to the point where the same apparatus ca be used several times. Also during this time enough experience has been gained so that th equipment for certain experiments can be "frozen" and manufactured in small quantities b commercial concerns on a competitive bid basis. Not only has the above ground work bee laid for future investigations but important scientific achievements have been made. Th intense day airglow has been noted and studied, a direct measurement of the solar constan has yielded a high value at the outer portion of the atmosphere and important data hav been obtained on the E layer of the ionosphere. Malfunctioning of a disproportionate numbe of vehicles has greatly handicapped this work but the author believes that this will not happe in the future, that the main technical problems are solved and that he is looking forward con fidently to a successful and thorough investigation of the properties of the lower part of th high atmosphere of the earth. *Subject Headings:* **1. Upper atmosphere research 2. Rocke research 3. Rocket instrumentation 4. Aerobee rockets.**—*Author's abstract.*

6.11–122 551.507.362:551.507.32

Van Allen, James A. and Gottlieb, Melvin B. (*State Univ. of Iowa, Iowa City*), **The in expensive attainment of high altitude with balloon-launched rockets.** (In: Boyd, R. L. F. Seaton, M. J. and Massey, H. S. W. (*eds.*), **Rocket exploration of the upper atmosphere** London, Pergamon, **1954.** p. 53–64. 6 figs., table, 4 refs., 4 eqs.) **DWB**—A simple scheme has been developed for lifting a small, instrumented rocket to some 35,000 to 85,000 ft altitud by means of a balloon and then for firing the rocket in a near-vertical direction. In this way the aerodynamic resistance of the lower atmosphere is eliminated. Payloads of 30 lb hav been sent to summit altitudes as great as 64 mi. The technique was first applied during Aug.– Sept., 1952, to cosmic ray studies above the appreciable atmosphere near the geomagnetic pole It is suggested that balloon-launched rockets ("rockoons") will make economically feasibl the conduct of a variety of high altitude experiments on a synoptic basis. *Subject Headings.* **1. Rocket soundings from balloons 2. Rockoons.**—*Authors' abstract.*

6.11–123 551.507.362:551.509.39:629.19

Wexler, Harry, **Observing the weather from a satellite vehicle.** Presented at the 3rd Symposium on Space Travel, New York, May 4, **1954.** *British Interplanetary Society, Journal* 13:269–276, **1954.** 2 figs. **DLC**—Clouds of a depression seen from above are described Requirements for locating and tracing cloud systems from a satellite are set out. The proposed

atellite circles the earth (pole to pole) in 4 hrs at a height of 4000 mi. View from such a atellite is described, including atmospheric systems. This could be transmitted automatically; ther observations would be possible from a manned satellite. *Subject Heading:* **1. Satellite bservatories.**—*C.E.P.B.*

INSTRUMENTS

See also: **Measurem. of wind velocity . . .** (Schotland), 6.11–93; **Diurnal and inter-diurnal pressure surfaces variations** (Johnson), 6.11–98; **Fog phenomena investigation** (Robinson), 6.11–286; *see also* special bibliography on **Cooling Power and its measurement,** p. 1622.

6.11–124 551.508.71

Barrett, Earl W.; Slater, Robert L. and Newton, Kenneth E., **Further improvements in he electronic dew-point hygrometer.** *Journal of Meteorology*, 12(4):308–313, Aug. **1955.** figs., ref. **DWB**—Improvements in the electronic hygrometer designed by BARRETT and HERNDON (*see* 2.7–41, July 1951, *MAB*) are in the stability of the servo-amplifier system, nechanical improvements and an indicator to facilitate operating. The new instrument is llustrated and described. Several in use in cumulus studies by airplane have proved stable, ccurate and speedy in response. *Subject Heading:* **1. Electronic dew point hygrometers.**—*C.E.P.B.*

6.11–125 551.508.77

Geselle, P. and Matzke, H., **Ein Gerät zur Registrierung der Niederschlagsdauer.** [An pparatus for recording rainfall duration.] *Zeitschrift für Meteorologie*, 9(5):150–153, May **1955.** fig., 13 refs. **MH-BH**—The apparatus, constructed at the Meteorological Observatory, Greifswald, has a built-in heater and so serves also for solid precipitation. It includes two raphite contacts separated by a ring-shaped gap of about 1 mm. Rain is collected in a olished nickel funnel above the gap and closes an electric circuit. Recording is electric. Diagram given. *Subject Heading:* **1. Rainfall duration recorders.**—*C.E.P.B.*

6.11–126 551.508.77

Griffin, Roger, **A home-made rainfall recorder.** *Weather*, 9(5):160, May **1954.** fig. **WB**—Describes a tipping bucket gage made from "odds and ends" recording in steps of 0.01 n., with a specimen trace. Total cost under £1. *Subject Heading:* **1. Rainfall recorders.** —*C.E.P.B.*

6.11–127 551.508.77

†Hamilton, E. L. (*Calif. Forest and Range Exp. Station*), **Rainfall sampling on rugged errain.** *U. S. Dept. of Agriculture, Technical Bulletin*, No. 1096, Dec. **1954.** 41 p. 26 figs. incl. photos), 2 tables, 31 refs. **DWB**—Investigations made since 1933 in the San Dimas and Big Dalton Canyons in the rugged San Gabriel Mountains of Southern California, show that a ertical rain gage does not give an accurate sample of the rainfall reaching the ground when inds are a factor. A tilted gage (normal to the slope) gives a good sample. In a 100-acre atershed, 19 vertical gages caught 15% less rain than 19 gages tilted; and a good correlation s found between wind speed and deficiency of catch in vertical gages. Formulas were em-loyed for correcting rain estimates from vertical gages by consideration of slope, aspect, torm direction and angle of inclination of rain, allowing a 19% error to be reduced to 1%. Claborate sampling techniques, networks of gages and experimental results are shown in raphs and charts. *Subject Headings:* **1. Rainfall sampling techniques 2. Rain gage accuracy . Tilted rain gages 4. San Dimas Forest, Calif.**—*M.R.*

6.11–128 551.508.77

Lewis, W. A. and Watkins, L. H., **Investigation into the accuracy of four types of rainfall ecorder.** *Royal Meteorological Society, Quarterly Journal*, 81(349):449–458, July **1955.** 7 gs., 4 tables, 3 refs. **DWB**—Recorders investigated were: Standard Meteorological Office otal-rainfall recorder; M.O. rate-of-rainfall recorder; Road Research Laboratory (D.S.I.R., Harmondsworth) combined total-rainfall and rate-of-rainfall recorder (orifice type); R.R.L.

rate-of-rainfall recorder (channel type). These are described and results of laboratory and field tests given. "It was found that mean rates of rainfall between given times could be measured within about 5% from the records from all the instruments, but that the chart speed of the M.O. total-rainfall recorder is too slow for peak periods of short duration to be located accurately. The principal advantage of the R.R.L. combined total-rainfall and rate-of-rainfall recorder is that it provides a clear picture of the shape of the storm curve which is very helpful in the analysis of the records." *Subject Heading:* **1. Rainfall recorders.**—*Authors' abstract.*

6.11–129 551.508.77

Spurr, G., **A comparison of the Dines and Bibby raingauges.** *Royal Meteorological Society, Quarterly Journal*, 80(344):237–238, April **1954.** 2 figs. **DWB**—The Bibby (*b*) rate of rainfall gage and Dines (*d*) recording gage were compared. Dines gage records about 95% of Bibby. Agreement of rate of rainfall less good; best fit $d = 1.03\,b + 2.5$, correlation 0.76. *Subject Heading:* **1. Rainfall recorders.**—*C.E.P.B.*

6.11–130 551.508.77

†Warnick, C. C., **Research with windshields for precipitation gages.** *Journal of Glaciology*, 2(16):387–388, Oct. **1954.** 4 figs., 17 refs. **DWB**—Describes a study by the Engineering Experiment Station of the Univ. of Idaho on high-altitude gages. Flow patterns were tested with sawdust in a wind tunnel. Models of hanging-baffle type were tried out at mountain stations. Catch increased from 30 to 70% of true fall. A radio-reporting gage was also investigated. *Subject Heading:* **1. Shielded snow gages.**—*C.E.P.B.*

6.11–131 551.508.95:551.594.12

Hess, V. F.; Parkinson, W. D. and Miranda, H. A., **Beta ray ionization from the ground.** Fordham Univ. Dept. of Physics, Contract AF 19(122)-409, Scientific Report, No. 4, Dec. **1953.** 44 p. 36 figs., 5 tables, 20 refs. **MH-BH**—Comparatively little was known about the contribution of beta rays to the ionization of the lower atmosphere. This report describes the method employed for measuring beta ray ionization in the field with portable ionization chambers. The method is new, and so is described in some detail. Results of measurements at sixteen locations in and around New York City are presented. These results are compared with the expected ionization computed from a knowledge of the average amounts of radioactive elements found in typical rocks, and the recently determined Eve's constants for these elements. Observed values are invariably higher unless precautions are taken to use surfaces of rock that have not been exposed to the atmosphere for more than a few months. The observed excess of ionization is ascribed to active contamination resulting from nuclear explosions. A comparison is made between beta and gamma ray ionization in which it is shown that, unless mixing in the atmosphere is almost zero, the effect of gamma rays greatly outweighs that of beta rays. *Subject Headings:* **1. Beta ray ionization 2. Ionization chambers 3. Ionization measurement 4. New York City.**—*Authors' abstract.*

6.11–132 551.508.96

Rakshit, H. and Chatterjee, S. D., **Ionospheric height measurement by the method of delayed coincidence.** *Naturwissenschaften*, 41(17):401–402, Sept. **1954.** 2 figs., 4 refs. **DWB**—An improved method of measuring vertical height with an accuracy of 0.1 km by means of two pulses is described, with circuit diagram. Output is fed to a cathode ray oscillograph and to earphones. It is being used for regular observations of lunar tides and can readily be made automatic. *Subject Heading:* **1. Ionospheric recorders.**—*C.E.P.B.*

6.11–133 551.508.99:551.574.1

Druett, H. A. and May, K. R., **Production of individual, sized, droplets by high-voltage "firing" from a micropipette.** *Nature*, London, 174(4427):467–468, Sept. 4, **1954.** 2 refs. **DWB**—Describes a method of producing droplets of any desired size down to 10μ. Construction and operation of apparatus are explained. *Subject Heading:* **1. Water drop production.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Fitzroy and weather forecasts** (Simpson), 6.11–56; **Meteorology and high altitude aircraft operation** (Dwyer), 6.11–69; **Service of Agro-Meteorological Station Belogork to agriculture** (Dadyko), 6.11–78; **Critique on fire weather forecasting** (Ayer), 6.11–85; **Atmos. conditions related to blowup fires** (Byram), 6.11–86; **Barometric tendency equation** Mazumbar), 6.11–94; **Observing weather from satellite vehicle** (Wexler), 6.11–123; **Horizontal transfer of angular momentum** (Matsumoto et al.), 6.11–194.

6.11–134 551.509.1

France. Météorologie Nationale, **Manuel des codes météorologiques. Codes 1949 odifiés le 1 Janvier 1955.** [Manual of meteorological codes. 1949 codes modified as of an. 1, 1955.] Paris, Jan. 13, **1955.** unpaged. **DWB**—French version of international codes ith each code and accompanying specifications on separate cardboard loose-leaf sheets, lainly legible at a distance. The codes are: 1) Synoptic and ship surface code, 2) Mountain oud code (MONT), 3) Nephoscopic (NEPH), 4) Pilot, Pilot ship, Pibar and Pibar ship winds aloft), 5) Temperature and temperature ship, 6) Mesran, Bartop, ABTOP, RETOP adiosonde), 7) SFAZI, SFAZU, SFLOC (sferics), 8) AERO, 9) POMAR, 10) CIA and CIA IARINE (analysis) and 11) Contour-Prontour, etc. *Subject Headings:* **1. Meteorological odes 2. Code specifications.**—*M.R.*

6.11–135 551.509.1

Great Britain. Meteorological Office, **Handbook of weather messages, Pt. 2, Codes and ecifications.** 2nd ed. London, H.M.S.O., **1954.** 20+113 p. At head of title, M.O. 510b. **t. 3, Coding, decoding and plotting.** 2nd ed. London, H.M.S.O., **1954.** 7+115 p. 7 figs., 2 tables. At head of title, M.O. 510c. **DWB**—Pt. 2 includes details and explanations of odes and specifications for compiling weather messages, recommended or retained by the ommission for Synoptic Meteorology in 1953 and approved for international use by the WMO. xecutive Committee in 1953. Pt. 3 contains instructions to observers in the use of codes. hapters deal with coding of surface observations including CLIMAT, upper air observations, eronautical forecast messages and analysis messages, and with decoding and plotting each these, with illustrations and examples. Instructions for recording observations are included. Appendices give tables for determining dew point. *Subject Heading:* **1. Synoptic odes.**—*C.E.P.B.*

6.11–136 551.509.1:621.394

Ockenden, C. V., **Meteorology and facsimile.** *World Meteorological Organization, WMO ulletin,* 3(1):30–35, Jan. **1954.** 2 figs. **DWB.** Summary of this paper by Vujičić, K., **renos slika pomoću metode faksimil.** [Transmission of pictures by means of the facsimile chnique.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 3(3/4):117, July/Dec. **1954. WB**—History of telegraphic or wireless transmission of pictures is outlined and the present chnical requirements for use in meteorology (transmission of weather maps) are outlined. he first service of this kind was initiated in the United Kingdom in 1929 for a short time. he main present problem in Europe is the standardization of equipment in different countries; n extensive network already exists in the U. S. *Subject Headings:* **1. Facsimile map transission 2. Standardization of equipment 3. Europe 4. United States.**—*A.A.*

6.11–137 551.509.1:629.13(02)

U. S. Air Weather Service, **Aeronautical meteorological codes.** Its *Manual* 105-24, d ed. Aug. 1, **1954.** 77 p. **DWB**—Manual containing detailed coding instructions for Air eather Service units using WMO AERO codes for implementation Jan. 1, 1955. Codes ecified are: 1) aeronautical and 2) forecast transmission. Consolidated code tables for rbulence, cloud, waves, fronts, ice accretion, visibility, weather, etc. are presented. In the ppendix the Highlevelforecast (Hifor) code, and a list of block numbers assigned to various rts of the earth for station designators is given. The 1st edition (Sept. 1, 1950) must be tained for decoding. *Subject Headings:* **1. Aeronautical meteorological codes 2. Forecast ansmission codes 3. Code manuals.**—*M.R.*

6.11–138 551.509.21

*Italy. Servizio Meteorologico dell'Aeronautica, **Bollettino Quotidiano d'Informazioni** No. 217, Sept. 21, **1954.** [Daily bulletin of Information, No. 217, Sept. 21, 1954.] Pub Rome, Ministero Difesa-Aeronautica. 4 p. figs., charts. **DWB**—The daily weather map or bulletin contains on p. 3 a rough isobaric and frontal chart for Europe (0100Z) and a summary of the weather conditions for the previous day, for the situation at time of the chart, and a forecast of cloud, precipitation, temperature and sea conditions for the current day. More detailed temperature, precipitation and state of weather charts without isarithms are given on p. 2 for Italy alone and on page 4 are 4 charts giving for the current month numerical values of mean monthly maximum and minimum and extreme daily maximum and minimum temperature, precipitation and cloudiness, respectively, for Italy. *Subject Headings:* **1. Daily weather maps 2. Italy.**—*M.R.*

6.11–139 551.509.3

*†Elliott, Robert D. and Kerr, Raymond E., Jr., **On the analysis and forecasting of flow patterns aloft from single station observations. A technical progress report to Bureau o Aeronautics Project AROWA** (TED-UNL-MA-501). Aerophysics Research Foundation Meteorological Div., Contract N189s-81138, Report 52-1, Feb. **1952.** 62 p. 17 figs., 1 tables, 30 refs., eqs. **DWB**—Methods of single station analysis for the 500 mb level are developed, using 3 types or models: 1) Zonal or high index model where winds aloft vary rapidly with time but are always westerly; 2) Meridional which may include easterly component and 3) Blocking model (warm closed high), including theory, contingency tables, schematic diagrams and synoptic examples. The most striking feature is the assumption on which the contingency table and location chart is based, that a wave pattern exists which is made up of a series of individual, nonrepeated troughs and crests, each with its own wave length, amplitude and speed, so that computations are valid downstream, but not at any distance upstream. More computations and tests must be made to determine whether this concept, or the classic "periodic wave family" concept (also developed in this paper) is most fruitful. *Subject Headings:* **1. Single station forecasting 2. Waves in the westerlies 3. Single station observations 4. Single station analysis.**—*M.R.*

6.11–140 551.509.31

Berkofsky, Louis, **The exact determination of the effective domain of dependence of a one-dimensional numerical prediction formula.** *Tellus*, Stockholm, 6(2):165–169, May **1954** fig., 6 refs., 31 eqs. **MH-BH**—By assuming sinusoidal initial conditions, an exact expression for determining the "cut-off" point of a one-dimensional influence function is derived. From this result one may construct tables of percent error incurred by terminating the influence function at various distances. *Subject Heading:* **1. Numerical forecasting.**—*Author's abstract.*

6.11–141 551.509.312:551.511:551.513.1

Bolin, Bert (*Stockholm Univ.*), **Numerical forecasting with the barotropic model.** *Tellus* Stockholm, 7(1):27–49, Feb. **1955.** 8 figs., 3 tables, 22 refs., 58 eqs. **DLC**—The experiment with numerical forecasting using the barotropic model have been continued and a number of 24, 48 and 72 hr forecasts are presented. The initial data for these forecasts covered an area of about 9000 by 12,000 km. The results indicate that the boundary influences become unimportant in the center of the area in the 24-hr forecasts but they may still cause errors in the 72-hr forecasts. In view of the approximations made, very good 72-hr forecasts have been obtained in some cases. The most successful one gave a correlation of 0.87 and a relative error of the forecast height changes of 0.58. Most of these extended forecasts should be of definite value in forecasting the weather. Large errors are, however, still obtained in some cases. The neglecting of baroclinic process is one of the reasons for these errors but it is quite obvious that the largest errors are of a different nature. Experiments are being conducted to find the sources of these errors. One line of this research is a general re-analysis of the assumptions made in deriving the barotropic model which is presented in the latter part of this paper. A number of improvements are suggested for further tests. *Subject Headings:* **1. Numerical forecasting 2. Barotropic models.**—*Author's abstract.*

6.11–142 551.509.312:551.511

Charney, J. (*Princeton, Inst. for Adv. Study*), **The use of the primitive equations of motion n numerical prediction.** *Tellus*, Stockholm, 7(1):22–26, Feb. **1955.** fig., foot-refs., eqs. **)LC**—An obstacle to the use of the primitive hydrodynamical equations of numerical pre- liction is that the initial wind and pressure fields determined by conventional means give ise to spurious large-amplitude inertio-gravitational oscillations which obscure the meteoro- ogically significant large-scale motions. It is shown how this difficulty may be overcome by he use of a relationship between wind and pressure which enables one to determine these ields in such a manner that the *noise* motions do not arise. The method is illustrated by a umerically computed example. The wind-pressure relationship is in a sense a generalization f the geostrophic approximation and may be used where the latter approximation is inappli- able, either to determine initial conditions or to derive a set of *filtering* equations for numerical rediction analogous to the quasi-geostrophic equations. *Subject Headings:* **1. Numerical orecasting 2. Equations of motion.**—*Author's abstract.*

6.11–143 551.509.312

*Flohn, Hermann; Hinkelmann, Karl; Hollmann, Günther; Schwarzenberger, R. and Vippermann, Friedrich, **Research on objective weather forecasting.** Germany. Deutscher Vetterdienst, Contract AF 61(514)-434, Final Report, foreword, Aug. **1954.** Each part epaged. figs., bibliogs., eqs. Contents: Pt. A, **Characteristic processes in numerical fore- asting.** 59 p. 23 figs., numerous eqs. Pt. B, **Some numerical tendency computations from multiple parametric model.** 17 p. 51 figs., 2 refs. Pt. C, **On the relation between the ields of wind and pressure and their dependence on geographic latitude.** 8 p. 4 figs., qs. Pt. D, **On the influence of disturbances on a nonhomogeneous basic current.** 20 p. figs., 28 eqs., 6 refs. Pt. E, **On the behaviour of truncation errors in solution of the two limensional and non divergent vorticity equation.** 10 p. 3 tables, fig., 6 refs., eqs. **DWB**— A report of work done by working group under HINKELMANN from July 15, 1953 to July 15, 954 on numerical prediction problems as indicated by parts listed above. In Pt. A, the heory of "characteristic processes," with 2 independent and with 3 or 4 independent variables, s elaborated. Application to meteorological problems is made, using hydrostatic and geo- trophic wind equations, neglecting vertical and total acceleration, respectively, using quasi- eostrophic approximation and, finally, involving the baroclinic case. In Pt. B the basic quations and the finite difference equations are set up, using a discontinuous model. Then he linear transformation of variables ϕ_t and ϕ (dynamic height), numerical solution of system, ages and their removal by block relaxation, and actual results of numerical weather pre- ictions (225, 300, 500, 700, and 850 mb tendencies) for a number of periods. In Pt. C the nfluence of latitude, Coriolis effect on wind and pressure field were tested using nongeostrophic ssumptions. In Pt. D the tendencies of the basic current and its kinetic energy are shown raphically for different parameters. Finally, discontinuities of the basic current are super- nposed by means of perturbations. *Subject Headings:* **1. Numerical forecasting 2. Europe.** *—M.R.*

6.11–144 551.509.312:551.515.11

Japan. Numerical Prediction Group, Tokyo, **Preliminary report on the numerical rediction over the Far East.** *Geophysical Magazine*, Tokyo, 26(1):35–51, Aug. **1954.** 7 figs., able, 4 refs., eqs. **DWB**—The usefulness of barotropic models in forecasting 500-mb height hanges in the Far East was investigated by applying Fjørtoft's graphical method and Bolin- Charney's relaxation method to aerological data of Japan and surrounding areas for Jan. 9–15, 953. Computed and observed values are compared. Preliminary results and errors are iscussed and objectives of future research outlined. *Subject Headings:* **1. Numerical fore- asting 2. Barotropic models 3. Relaxation methods 4. Height tendency computation.** *—G.T.*

6.11–145 551.509.312

Kubota, S. (*Met. Res. Inst., Tokyo*), **Numerical prediction by the quasi-double Fourier eries.** *Papers in Meteorology and Geophysics*, Tokyo, 5(2):144–152, Sept. **1954.** 7 figs., refs. **MH-BH**—The purpose of the present paper is to examine the possibility of numerical

prediction by Fourier series and to analyze the atmospheric structure. Multiplying the vorticity equation by a periodic function and integrating it from 0 to 2π (along a latitude circle), certain equations can be obtained. The following results can be derived from numerical calculation on the barotropic model, i.e., 1) Numerical prediction is possible by the Fourier series with the harmonics from $n=1$ to $n=9$. 2) Correlation between the zonal flow of *component-wave vorticity* by the mean flow and the meridional flow of absolute mean flow vorticity by that component wave is negative at middle latitudes from 55°N to 40°N, and positive at 60°N. 3) The same relation as in 2) can be found in the interaction between the component waves. 4) The non-linear effect at lower latitudes than 55°N is reverse to that at 60°N, which, coupled with that shown in 2) and 3), tells us that 55°N latitude circle, roughly speaking, forms a kind of nodal line. 5) Magnitude of time change of amplitudes of long waves cannot be explained by the barotropic and non-divergent model, perhaps due to the upward motion and horizontal stability changes caused by the topography. *Subject Headings:* **1. Numerical forecasting 2. Fourier series 3. Barotropic models.**—*Author's abstract.*

6.11–146 551.509.312:681.14

Stockholm. **Tekniska Högskolan. Institute of Meteorology, Results of forecasting with the barotropic model on an electronic computer (BESK).** *Tellus*, 6(2):139–149, May **1954.** 11 figs., table, 4 refs., 4 eqs. **MH-BH**—A series of twenty-four 24-hr forecasts have been completed using the barotropic model of the atmosphere. The results of these forecasts are better than previous tests with this model have indicated. The average correlation coefficient between computed and observed height changes of the 500 mb surface is 0.77, the error in the forecast height changes is 89 m against an average observed change of 121 m. The errors are mainly due to the following factors: 1) Erroneous assumptions at the boundary of the forecast area, 2) Inaccurate analysis of the initial data over the Atlantic, 3) Inaccuracy in forecasting components of the motion of a scale only a few times larger than the grid size, 4) Baroclinic developments. The computations indicate that the present results may be improved considerably by trying to eliminate errors under (1)–(3). *Subject Headings:* **1. Electronic computers 2. Barotropic models 3. Numerical forecasting 4. Forecast improvement.** —*Author's abstract.*

6.11–147 551.509.312

Sutton, Sir Oliver Graham, **High-speed computing and the operational meteorologist.** *Weather*, 10(6):190–193, June **1955. DWB**—Analogy between numerical forecasting and contract bridge. Bidding is forecasting number of tricks, based on a system and the most probable initial distribution of the unknown factors. The expert recognizes and allows for abnormalities. *Subject Heading:* **1. Numerical forecasting.**—*C.E.P.B.*

6.11–148 551.509.312:551.511

Thompson, Philip D. (*U. S. A. F. Cambridge Res. Center, Mass.*), **A note on the integration of the vorticity equation for quasi-geostrophic flow.** *Tellus*, 6(4):319–325, Nov. **1954.** fig., 7 refs., 14 eqs. **MH-BH**—By the transformation of integrals arising from the solution of the "quasi-geostrophic" equations for barotropic and simple types of baroclinic flow, it is shown that the isobaric height tendency can be expressed in terms of *first derivatives* of the heights of isobaric surfaces. This demonstrates that the procedure by which the equations are solved must tend to cancel or "average out" the large percentage errors in the geostrophic vorticity advection—i.e., errors in second and third order finite-differences. The height tendency may be computed by a simple graphical procedure, which is carried out directly on analyzed contour charts and which involves a minimum of multiplications. *Subject Headings:* **1. Numerical forecasting 2. Vorticity equations.**—*Author's abstract.*

6.11–149 551.509.312:551.511:551.551

Thompson, Philip Duncan, **Prognostic equations for the mean motions of simple fluid systems and their relation to the theory of large scale atmospheric turbulence.** *Tellus*, 6(2):150–164, May **1954.** 6 refs., 21 eqs. **MH-BH**—By making use of the mathematical properties of certain special types of weighted means—taken either areawise or timewise—it has been shown that a variable's deviation from its mean can be expressed in terms of the

ıean itself. This result has been used to derive a closed system of equations for the mean ıotion of an incompressible autobarotropic fluid. Comparison of the equations for area-veraged and time-averaged motion reveals that the area mean has certain advantages, ıherent in the form of the equation for the unaveraged motion. The eddy transport for the ase of "strong averaging" is contrasted with that derived from the classical "mixing-length" ıeory of eddy diffusion. The usual restrictions on the statistics of eddy fluctuations are ound to be inconsistent with the unrestricted form of the eddy transport. Finally, it has een shown that these methods can be extended to the derivation of closed systems of equations or the mean motions of simple baroclinic fluids. *Subject Headings:* **1. Numerical forecasting . Turbulence theory.**—*Author's abstract.*

6.11–150 551.509.312

Watanabe, Tsugio, **On the horizontal divergence of the integrated atmosphere.** *Journal f Meteorological Research*, Tokyo, 6(7):214–220, Sept. **1954.** 4 figs., table, 8 refs., 10 eqs. In apanese; English summary p. 214. **DWB**—Assuming that the integrated wind component long the vertical is U, V, and that the surface pressure is p_0, the tendency equation of the ırface pressure is

$$\frac{\partial p_0}{\partial t}+\frac{\partial (p_0 U)}{\partial x}+\frac{\partial (p_0 V)}{\partial y}=0.$$

hen the horizontal divergence of the stationary integrated atmosphere is given by

$$\frac{\partial U}{\partial x}+\frac{\partial V}{\partial y}=-\frac{1}{p_0}\left(U\frac{\partial p_0}{\partial x}+V\frac{\partial p_0}{\partial y}\right).$$

ın integrated atmosphere map of the winter season of the North American area was con-tructed by making use of the monthly mean charts of 850 mb, 700 mb, 500 mb, and 300 mb sobaric surface, and the horizontal divergence chart was obtained. The principal results are s follows: (1) The western part of the continent is the convergence area, and the eastern art of the continent is the divergence area, the order of divergence or convergence being 0^{-7} sec^{-1}; (2) The estimated distribution of the divergence in winter season at the 500 mb evel after B. Bolin and J. Charney corresponds well with the author's result and this fact s important for numerical forecasting and (3) An application to numerical forecasting of ırface pressure is discussed. *Subject Heading:* **1. Numerical forecasting.**—*Author's abstract.*

6.11–151 551.509.312:551.515:551.553.8

Wexler, Harry (*U. S. W. B., Wash., D. C.*), **Dynamic linkages between westerly waves nd weather.** *Washington Academy of Sciences, Journal*, 45(2):46–48, Feb. **1955.** 6 refs. **)WB**—In connection with improved 3-dimensional coverage of the earth by networks, surface bservations and upper air soundings, and mechanical methods of computing, it is necessary o interpret the resulting large scale flow patterns in terms of "weather" or cloudiness and recipitation by better understanding of small scale eddies, vertical motions of medium and mall scale, line squalls and other line phenomena (pressure jumps, tornadoes, mountain nduced troughs and consequent weather). Other types of small or medium scale phenomena etting energy from zonal flow or vertical motions are spiral waves or bands of cloud from urricanes or thunderstorm areas and cloud streets. Thunderstorm or shower precipitation s another difficult problem in forecasting because of scale of phenomenon. *Subject Headings:* **. Numerical forecasting 2. Local forecasting 3. Line phenomena.**—*M.R.*

6.11–152 551.509.312

Wilson, H. P., **Test of a grid method of forecasting the motions of lows at 500 millibars n Arctic regions.** *Canada. Meteorological Div., Cir*-2539 TEC-194, Oct. 4, **1954.** 8 p. ig., 3 tables, 2 refs. **DWB**—Riehl's grid method for forecasting the 24-hr motions of hurri-anes which is "essentially a method for measuring mean zonal and meridional geostrophic vind components over an area around the hurricane roughly around 1000 mi square" was nodified into a square grid so that "the gradients measured are parallel to the great circles t right angles to each through the center of the low and not strictly zonal or meridional com-

ponents." It was applied to the Arctic, where air masses are predominantly barotropic, an tested with 500 mb charts of the Historical Weather Map series for Jan.–Sept. 1951. Th method developed for the Arctic is described and the assumptions and errors are discusse This grid method was found to give satisfactory forecasts about two-thirds of the time. *Subje Headings:* **1. Numerical forecasting 2. Forecasting techniques 3. Forecasting cold lo 4. Arctic weather forecasting.**—*I.L.D.*

6.11–153 551.509.317:681.1

Bushby, F. H. and Hinds, Mavis K., **Further computations of 24-hr pressure change based on a two-parameter model.** *Royal Meteorological Society, Quarterly Journal,* 81(349 396–402, July **1955.** 2 figs., 5 tables, 4 refs., 5 eqs. **DWB**—Forecasts 24 hrs ahead wer computed (by electronic machine) of 500 and 1000 mb heights and 1000–500 mb thicknes for a further 13 occasions, using a 2-parameter model. Results were only slightly less goo than conventional forecasts. Introducing a term for effect of heating over the sea, and est mated 600 mb heights instead of 500 mb, resulted in slight improvements. Most of the erro was due to assumed constant boundary conditions. *Subject Headings:* **1. Numerical forecastin techniques 2. Electronic computers.**—*C.E.P.B.*

6.11–154 551.509.317:551.557:519.

Ellison, T. H. and Walshaw, C. D., **The evaluation of some regression coefficients fo estimating the 150-mb wind at Liverpool.** *Royal Meteorological Society, Quarterly Journa* 81(349):480–483, July **1955.** 3 tables, 5 refs. **DWB**—Vector regression equations of th 150 mb wind at Liverpool in winter are tabulated on the 300 and 500 mb wind (singly an together) at the time and the 150 mb wind 12 and 24 hrs previously. Agreement betwee computed and observed values was excellent. Forecasts of 150 mb wind based on valu 12 hrs previously are of comparable accuracy with orthodox methods. *Subject Headings* **1. Winds aloft forecasting 2. Regression equations 3. Liverpool, England.**—*C.E.P.B.*

6.11–155 551.509.33

Clapp, Philip F., (*U. S. W. B., Wash., D. C.*), **Practical application of the barotropi vorticity equation to extended forecasting.** U. S. Weather Bureau, Sept. **1954.** 30 p. 1 figs., 16 refs. **DWB**—In this study the attempt is made to utilize the complete two-dimensiona barotropic vorticity equations for long range forecasting. The earlier applications of vorticity principles to planetary waves are reviewed. The generalized versions of the Rossby wave formula and another equation giving "the instantaneous motion and development of centers o maximum and minimum departure from normal of upper level height contours" are presented In an empirical section an attempt is made to determine the validity of the theoretical deductions The derivation of formulas for motion and development of anomalous vortex centers is pre sented in an appendix. *Subject Headings:* **1. Numerical forecasting 2. Long range fore casting 3. Barotropic vorticity equations.**—*I.L.D.*

6.11–156 551.509.33:519.2

Müller-Annen, Hans, **Versuche von Langfrist-Vorhersagen mit einer Kontingenzmethode. (Untersuchungen, Gedanken und Methoden zur Langfrist-Vorhersage, 8 Beitr.)** [Research on long-range forecasting with a contingency method. (Investigations, ideas and methods of long-range forecasting, Pt. 8.)] *Annalen der Meteorologie,* 6(9/10):257–270, **1953/1954.** fig., tables, 6 refs. German and English summaries p. 257. **DWB**—Observations are divided into 4 equal groups by quartiles and median. For 2 variables (predictor and predictand) this gives 16 classes, and ratios of numbers in each class to chance are calculated. The predictors are then weighted accordingly, and a prediction table constructed from the values for the preceding 12 months. The procedure was tested on monthly raindays at Gütersloh, divided into wet (oceanic) and dry (continental) epochs. Dec., Jan. and April were the best predictors, Feb. and May the best predictands. The method of forecasting is set out. Test "forecasts" were made for 96 months and 8 years for raindays and amount at Gütersloh and temperature at Kleve. The % success greatly exceeded that given by chance. *Subject Headings:* **1. Long range forecasting 2. Statistical forecasting 3. Gütersloh, Germany.** —*C.E.P.B.*

6.11–157 551.509.33:519.24

*Willett, Hurd C., **Significance of lag relationships among temperature and precipitation anomalies used for contingency forecasting.** Weather Services, Inc., Boston, Contract AF 19(604)-449, Scientific Report, No. 3, **1954.** 6 p. 5 tables, fig., foot-ref. **DWB**—An independent check was made of the significance of lag relationships found in an earlier unsuccessful attempt at long-range forecasting for New England by contingency tables (Scientific Report, No. 1; *see* 5.9–83, Sept. 1954, *MAB*). For 8 widely scattered districts in U. S. for monthly anomalies, $(a-b)/(a+b)$ was found, where a, b are numbers of like and unlike signs (0, 1 and 2 months lag) for temperature T and rainfall R. These were classified by significance levels. T/T relations were the most significant but gave prediction values of only 18%, most of which was probably due to persistence. R/R relations are obscured by reversals due to some other factor. *Subject Headings:* **1. Statistical forecasting 2. New England.** —*C.E.P.B.*

6.11–158 551.509.5:551.515.3

*Barnett, Kenneth Marshall, **A test of tornado forecasting parameters.** Washington, D. C., U. S. Weather Bureau, **1954.** 6+p. 12 figs., table, 5 refs. Mimeo. **DWB**—The Severe Local Storm Warning Center (SELS) of the U. S. Weather Bureau has assembled information on objective forecasting and selected the most effective parameters for operational use after testing their relative accuracy. The 5 conditions which indicate a tornado "threat area," and 4 additional conditions which give "major confidence" to forecast, plus a simple procedure for determining the approximate area are given. Surface dew point, the "Stability Index" and "Tornado Index" of Showalter, the depth of the "moist layer," the 700 or 500 mb winds and the level of free convection are the most significant criteria for forecasting. Examples of application of procedure outlined are given. *Subject Headings:* **1. Tornado forecasting parameters 2. Objective forecasting 3. Showalter's Stability Index. I. U. S. Weather Bureau.**—*M.R.*

6.11–159 551.509.5

Jorgensen, Donald L. (*U. S. W. B. Airport Sta., San Francisco*), **Note on the measurement of forecast skill using a moving class interval.** *Monthly Weather Review*, 83(1):11–13, Jan. **1955.** table, 3 refs., 3 eqs. **DWB**—The use of a moving class interval in calculating a skill score for a series of forecasts is investigated. When forecasts are expressed in quantitatively exact terms, it is found that the use of this type of interval in calculating the correct and expected correct number of forecasts gives a good measure of the skill of the forecasting procedure. *Subject Heading:* **1. Forecasting skill calculations.**—*Author's abstract.*

6.11–160 551.509.5:551.575.1

†Stewart, K. H., **Radiation fog: investigations at Cardington, 1951–54.** *Great Britain. Meteorological Research Committee, M.R.P.* 912, 27 May **1955.** 42 p. 18 figs., 6 tables, 21 refs., eqs. Mimeo. **DWB**—Numerous meteorological elements were observed at Cardington, at 2, 20 and 55 ft on a tower, up to 4000 ft by captive balloon, and in the ground to 40 cm, whenever fog was forecast. The site and instruments are described by R. H. Pedlow. Six typical cases are discussed: two (most frequent) with steep inversion below 50 ft in early evening, sharpening and deepening; two with cooling spread through lowest few hundred feet, and two when fog did not form. Mean wind profiles show a decrease in speed with increasing height above 750 ft on foggy nights, probably a thermal wind effect. In Sec. 3 the heat balance, heat exchange with cooling layer, and flow of water vapor are discussed quantitatively. At Earth's surface the heat losses by radiation, conduction and convection are roughly equal. Sec. 4 takes up empirical fog forecasting, and produces a diagram based on screen temperature and dew point at time of dew formation, and forecast grass minimum. Future lines of research are suggested. Appendixes discuss various physical problems. *Subject Headings:* **1. Radiation fog forecasting 2. Cardington, England. I. Pedlow, R. H.**—*C.E.P.B.*

6.11–161 551.509.54

Foster, Donald S. and Bates, Ferdinand C. (*SELS Center, U. S. W. B. Airport Station, Kansas City, Mo.*), **Hail size forecasting technique.** U. S. Weather Bureau, Jan. 1, **1955.**

20 p. 8 figs. (photostats), 4 tables, 6 refs. Carbon of typescript. **DWB**—A technique f forecasting hailstone size is presented. In developing this method, it is assumed that: (hail size is proportional to the updraft velocity within a thunderstorm; (b) the updraft velocit derives from parcel buoyancy; (c) the updraft velocity may be approximated from positi area measurements on a thermodynamic diagram; and (d) that reasonably accurate forecas of thunderstorm occurrence may be effected through other considerations. A comparis between the results of this technique and that developed by FAWBUSH and MILLER is mad It is concluded that the technique described here represents an improvement and avenu for further refinement are suggested. *Subject Heading:* **1. Hailstone size forecasting.**—*Author abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

See also: **Paleogeography: historical geography** (Markov), 6.11–18; **Microwave frequency and atmos. profiles** (Williams), 6.11–361.

6.11–162 551.510.3:551.510.5

*Elterman, L., **Seasonal trends of temperature, density, and pressure in the stratospher obtained with the searchlight-probing technique.** *U. S. Air Force. Cambridge Researc Center, Geophysical Research Papers*, No. 29, July **1954.** 70 p. 22 tables, 34+figs. (fold.) 12 refs. **DWB**—Light-scattering measurements from a searchlight beam were carried ou in the vicinity of Albuquerque, New Mexico, during the period 29 May through 23 Oct. 1952 Data were acquired on distributions of density, temperature, and pressure to an altitud of 67.6 km. The density information was obtained by formulating an expression based on th following: Rayleigh scattering, searchlight geometry, attenuation in the atmosphere, and th characteristics of the instrumentation. From the density distributions obtained, corresponding temperature profiles were derived. The density-temperature equation required the evaluatio of an integration constant, which was accomplished by using radiosonde information and physically acceptable temperature lapse rates. With the densities and temperatures es tablished, the pressure distribution was obtained from application of the gas equation o state. Ninety sets of measurements were obtained during 18 nights when the sky was clear and moonless. Density distributions and temperature profiles are presented for each night Monthly averages were calculated so that the presence of seasonal trends could be determined An overall representation of stratosphere conditions over New Mexico, based on the average of the 90 sets of measurements, is submitted. (*See also* 6.8–138, Aug. 1955, *MAB.*) *Subject Headings:* **1. Searchlight techniques 2. Stratospheric temperatures 3. Stratospheric density 4. Stratospheric pressure 5. Seasonal trends.**—*Author's abstract.*

6.11–163 551.510.3:551.510.53:551.507.362

Smith, Haldon L.; Early, Harold C. and Spencer, Nelson W., **Rocket measurement of upper atmosphere density by Paschen's law.** Michigan. Univ. Engineering Research Institute, Contract AF 19(604)-545, Scientific Report, CS-3, May **1955.** 41 p. 15 figs. (incl. photos), foot-refs. **DWB**—The air density in the region adjacent to the surface of a supersonic cone in the upper atmosphere has been measured by means of a spark-breakdown technique based on Paschen's law. A spark gap was incorporated into the nose of an Aerobee rocket and consisted of alternate metal and dielectric laminations. The breakdown path was essentially parallel to the surface of the cone and provided for a measurement without changing the air flow past the missile. The spark-breakdown technique was evaluated by measurements taken in a large vacuum chamber, and investigations were made into the statistical deviation from the mean calibration curve, and of the consequences of initial ionization. The effects of the high air velocity upon the breakdown were also considered. The Paschen's law density measurements have been compared with data derived from Alphatron pressure gages included in the rocket instrumentation and were found to have a consistently lower value. This discrepancy is believed to be due largely to the influence of the boundary layer upon the location of the discharge path. *Subject Headings:* **1. Upper atmosphere density 2. Rocket research.** —*Authors' abstract.*

6.11–164 551.510.41

Dole, Malcolm; Lane, G. A.; Rudd, D. P. and Zaukelies, D. A., **Isotopic composition of nospheric oxygen and nitrogen.** *Geochimica et Cosmochimica Acta*, 6(2/3):65–78, Sept. 54. 3 tables, 10 figs., 14 refs., eqs. **DLC**—High altitude air samples collected in glass lbs during balloon flights up to heights of 87,000 ft were found to contain oxygen with a rmal isotope ratio, deviations less than ±0.05%. Air samples collected in Aerobee rockets to altitudes of 51.6 km contained nitrogen having a normal isotope ratio, deviations less an ±0.15%. The oxygen of the rocket samples contained a higher percentage of O^{18} than rmal, but when an estimated correction was applied for the preferential loss of O^{16} by clean-up oxygen by the steel collecting tanks, the O^{18} percentage of the oxygen in air at 51.6 km was rmal to ±0.3%. Air collected at ground level in a number of locations all over the world ntained oxygen having a normal isotope ratio to ±0.025%. Air pumped out of ocean water different depths in the Pacific Ocean contained oxygen having a higher O^{18} percentage an normal; the less the percentage of oxygen in the sample, the greater was the O^{18} per-ntage. The oxygen isotope fraction factor for the process consuming dissolved oxygen was 991. The nitrogen isotope ratio in dissolved ocean air was normal. The oxygen isotope ctional factor for the clean-up or chemisorption of oxygen by steel was 1.026, while the ctor was 1.061 for the clean up of oxygen by copper. *Subject Headings:* **1. Air sampling d analysis 2. Isotope content of air.**—*Authors' abstract.*

6.11–165 551.510.41:546.214

Regener, Victor H., **Atmospheric ozone in the Los Angeles region.** New Mexico Univ. ept. of Physics, Contract AF 19(122)-381, Scientific Report, No. 3, July 22, **1954.** 21 p. figs., 15 refs. **MH-BH**—The results of measurements of atmospheric ozone obtained ring the summer of 1952 in the Los Angeles region are presented in graphs. The author scusses the diurnal variation of atmospheric ozone at the surface and its correlation with mospheric temperature, relative humidity and visibility, the relationship of ozone occurrence air pollution and the problem of the origin of ozone. *Subject Headings:* **1. Ozone near e ground 2. Ozone effects 3. Los Angeles, Calif.**—*I.L.D.*

6.11–166 551.510.41:546.214

Ungeheuer, H. (*German Weather Bureau, U. S. Zone*), **Ueber die Beziehungen des boden-hen Ozone zu atmosphärischen Vorgängen.** [On the relation of ozone near the ground atmospheric processes.] *I.U.G.G. Association of Meteorology, Brussels*, 1951, *Procès-rbaux des séances, Mémoires et discussions*, p. 372–376. pub. **1953.** 2 figs. **DWB**—rrent automatic ozone measurements have been made since March 1949 with an instrument signed by CURRY-DIRNAGL, employing the iodine-kalium method. One calibration was ade with an Ehmert ozone meter. The ozone concentration near the ground increases ways during intensive exchange with the middle layer of the troposphere (thermal and dy-mic exchange, föhn, mountain winds). *Subject Headings:* **1. Ozone near the ground Ozone measurements 3. Vertical exchange variations 4. Bad Tölz, Germany.**—*A.A.*

6.11–167 551.510.41

Williams, Dudley, **Further studies of atmospheric composition by airborne infrared gas.** hio. State University. Research Foundation, Contract AF 19(122)-13, Scientific Report, o. 14, **1954.** 30 p. 15 figs. **DWB**—The flight systems used in attempts to map the CO_2 ofile in the atmosphere are described in this report. The results obtained in flights made ring the summers of 1953 and 1954 are presented and criticized. Modifications of the esent equipment for use in possible future work in this field are suggested. *Subject Headings:* **Chemical composition of atmosphere 2. Air-borne infrared gas analyzers.**—*Author's stract.*

ATMOSPHERIC POLLUTION

6.11–168 551.510.42

Hilst, Glenn R. and Moses, Harry (*Argonne Nat. Lab., Lemont, Ill.*), **The Argonne experi-ental meteorology stack.** *American Meteorological Society, Bulletin*, 36(1):31–32, Jan. **1955.** figs. **MH-BH**—The authors describe the design requirements of the experimental meteor-

ology stack, the general arrangement of the component parts of the stack installation, t control of the airglow and the measurement of flow rate and temperature. A diagram of t motor blower arrangement and a photograph of the stack are shown. *Subject Headin* **1. Stack meteorology 2. Atmospheric pollution 3. Stack effluents.**—*I.L.D.*

6.11–169 551.510.

*Hitchcock, Lauren B. (*Pres. Air Poll. Found.*), **President's report, delivered to t Trustees and supporters of the Foundation at the First Annual meeting of the Board Trustees** [of the Air Pollution Foundation], Nov. 16, **1954.** 20 p. illus., 4 tables.— end of first year the President reported on the staff (incl. DR. M. NEIBURGER, Sr. Meteo ologist), evaluation of data in meteorology of the Los Angeles Basin by NEIBURGER a EDINGER (*see item* 6.6–148, June 1955, *MAB*), collection of information as to what oth cities are doing, maintenance of library on air pollution, exchanging information and conducti research. Among the latter projects are studies of imperfect combustion, air tracer or tr jectory studies, pilot plant studies of Los Angeles Basin atmosphere. A list of 24 projec costing $1,340,000 includes many of interest to meteorologists (visibility, O_3, radiation, a sorption spectra, etc.). *Subject Headings:* **1. Atmospheric pollution research 2. Los Angel Basin. I. Air Pollution Foundation.**—*M.R.*

6.11–170 551.510.42:546.

*Richards, S. H., **Survey of the concentration of sulphur dioxide in the air of South-We London: a first appraisal of results.** *Institute of Fuel, London, Journal*, 25(146):261–266, 27 Nov. **1952.** 10 figs., 9 tables, 2 refs. Abstracted from separated sheets. **DWB**—Repo on a comprehensive observation program conducted during 1945–50 to see if flue gas washi at Fulham and Battersea power plants reduced the amount of SO_2 in the atmosphere in th heavily built-up area of London. Data from each of 30 stations (26 at street level and 4 c buildings) are shown for summer and winter periods of each year, and on seasonal charts concentration of SO_2. Wind frequency observations for Kew (thrice-daily) are shown f summer and winter seasons of each year in tables and wind roses (on the respective contou charts). No appreciable reduction in SO_2 concentration was evident in spite of flue washin This is due to large amounts of SO_2 from other sources in area. *Subject Headings:* **1. A mospheric pollution studies 2. Sulphur dioxide in the atmosphere 3. London, Englan** —*M.R.*

6.11–171 551.510.42:628.5

Scorer, R. S., **Plumes from tall chimneys.** *Weather*, 10(4):106–109, April **1955.** 5 figs 3 refs. *See also:* [Sheppard, P. A.], **Smoke plumes and how to control them.** *Ibid.*, p. 12 **DWB**—Discussion of the effect of a high velocity of emission and a high temperature on th spread of stack effluents; the effect of stable conditions and the harmful effect of washin plumes is described with examples. *Subject Headings:* **1. Atmospheric pollution 2. Stac effluents.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Met. and high altitude aircraft operation** (Dwyer), 6.11–69; **Upper air res.** (O'Day), 6.11–121; **"Quantum" stratosphere determination** (Dedebant), 6.11–184; **Upper east wind of Copernicus** (Stenz), 6.11–198; **Seasonal ozone absorption** (Pressman), 6.11–225.

6.11–172 551.510.52/3:551.513.

Hughes, Grover D. and Foster, Robert I. (*U. S. W. B., WBAN Analysis Center, Wash. D. C.*), **The tropopause during a major change in circulation over the Western United States November 25 to 28, 1954.** *Monthly Weather Review*, 82(11):343–353, Nov. **1954.** 16 figs. table, 7 refs. **DWB**—The authors analyze the changes in the tropopause that occurred durin a period of rapid (3-day) replacement of the long wave ridges over western North Americ by a trough and the relationship of the tropopause to other upper air features and surfac conditions. "The tropopause is treated as a physical surface embedded in and moving wit the atmosphere" and the variations in the tropopause and in such related meteorologica

rameters as cyclonic vorticity, position of the jet stream and the 1000–500 mb thickness tterns are analyzed as they move through a vertical cross section. *Subject Headings:* **Tropopause variations 2. Atmospheric circulation 3. Jet stream 4. Western United ates.**—*I.L.D.*

6.11–173 551.510.534

Khaleq, Abdul and Vassy, Arlette, **Variation diurne de l'épaisseur réduite et de la temrature moyenne de l'ozone atmosphérique aux basses latitudes.** [Diurnal variation of duced thickness and mean temperature of atmospheric ozone in low latitudes.] *Académie s Sciences, Paris, Comptes Rendus,* 235(14):737–738, Oct. 16, **1952. DWB**—Measurement reduced thickness of atmospheric ozone made at Kabul (Afghanistan) from Dec. 1950 to ec. 1951 is reported. Values of reduced thickness showed definite decrease about local noon, the order of 5% in winter and over 20% in spring and summer. *Subject Headings:* **1. Ozone riations 2. Ozonosphere temperature variations 3. Seasonal ozone observation variations Kabul, Afghanistan.**—*G.T.*

6.11–174 551.510.534

Regener, E., **Ozon in der Troposphäre.** [Ozone in the troposphere.] *I.U.G.G. Assoation of Meteorology, Brussels,* 1951, *Procès-Verbaux des séances, Mémoires et discussions,* ub. **1953.** p. 311. **DWB**—Improved KI measurements, made at the surface and from anes, showed that turbulence and advection are the main factors changing the ozone content the air. *Subject Headings:* **1. Ozone variations in upper atmosphere 2. Turbulence effects.** *A.A.*

6.11–175 551.510.535:523.74:550,385

Geophysical aspects of solar flares. *Observatory,* London, 75(885):61–67, April **1955.** refs. **DLC**—At Royal Astronomical Society meeting on Nov. 26, 1954, H. W. Newton scribed solar flares and their radio and geomagnetic effects. J. S. Hey referred to asymmetry outbursts of radio emission from flares. M. A. Ellison discussed 5–10-fold increase of nization of D layer by bursts of UV-radiation. Origin of crochets was considered. K. eekes described measurements of phase changes of reflected radio waves associated with Ds. H. Elliot discussed distribution of cosmic ray intensity during 4 solar flares. *Subject eadings:* **1. Solar flares 2. Geomagnetic disturbances 3. Ionospheric disturbances.**—*E.P.B.*

6.11–176 551.510.535:538.566.3:535.515

Turner, C. H. M., **Birefringence in crystals and in the ionosphere.** *Canadian Journal Physics,* 32(1):16–34, Jan. **1954.** 6 figs., 15 refs., 33 eqs. **DWB**—Propagation of plane ectromagnetic waves in a homogeneous ionized gas in a uniform magnetic field is compared th the propagation of light in an optically inactive birefringent crystal. It is well known that opagation in a crystal may be described by using a system of real orthogonal axes for which e dielectric constant is given by a diagonal matrix. This paper shows that propagation of ane waves in the ionosphere may be described in a similar manner, the medium having effective dielectric constant given by a diagonal matrix, provided that a system of "complex" thogonal axes is used for the description of the components of the field vectors. This set component axes (which is quite different from and not to be confused with coordinate axes) equivalent to resolving the field vectors into components parallel to the magnetic field d two contrarotating *circular* components in a plane perpendicular to the magnetic field. n expression giving the velocity of each of the two modes of propagation in a given direction d expressions for the amplitude of each component of the field vectors are obtained. Prodded that one accepts the concept of a complex velocity of propagation, the results hold when ectron collisions are included. When electron collisions are neglected, it is possible to form a ouble-sheeted surface, called the normal velocity surface, which is of some assistance in sualizing the manner in which the velocity or propagation of the plane waves in each mode anges with direction. *Subject Headings:* **1. Electromagnetic wave propagation 2. Double fraction.**—*Author's abstract.*

6.11–177 551.510.536:523.59

Astapovich, I. S., **Problema protivosiianiia.** [Problem of the counterglow.] *Priroda*, Moscow, No. 1:25–32, Jan. **1950.** 3 figs., 14 refs. **DLC**—Glyden-Moulton's meteoric theory explaining the nature of the counterglow was for a long time regarded as the correct explanation of the phenomenon. In 1938 a group of scientists of the Sternberg Astronomical Institute under Prof. Moiseev found this theory to be incapable of explaining the nature of the counterglow from the standpoint of celestial mechanics. New detailed observations of the counterglow were carried out by a group of scientists of Moscow University from Oct. 1942 to May 1944 at Ashkhabad (Turkmenian ASSR). They show that 1) the luminosity of the counterglow is variable; 2) a flareup coincides with an auroral maxima; 3) the dimensions and shape of the counterglow are not constant, etc. The results of these visual observations were confirmed by photometric measurements at Alma Ata Observatory made by Fesenkov and Diwari of the counterglow luminescence and determinations (photographic) of its parallax which was found to be close to 3°. In addition Fesenkov observed in 1948 the phenomenon of "false zodiacal light" which, in the opinion of Fedynskiĭ (1949), is a lateral projection of the earth's gaseous tail in the sky. The same phenomenon had been observed in May 1905 by V. M. Sykes, but it was not taken seriously by the British Astronomical Association and it was then "regarded with doubt." The author concludes that the nature of the counterglow is gaseous and is continuously replenished by the earth's atmosphere. Further, he discusses the chemical composition of the gaseous tail of the earth and the probable amount of gas the earth's atmosphere is losing to maintain the tail and points out that the idea that the earth has a gaseous tail is only a hypothesis and has not been proven yet. English translation of paper included in Hope, E. R., **The earth's exterior atmosphere and counterglow.** 2nd ed. Ottawa, Defence Research Board, Defence Scientific Information Service, July **1954.** (*See item* 6.5–8, May 1955, *MAB.*) *Subject Headings:* **1. Counterglow 2. Gaseous tail of earth's atmosphere.**—*A.M.P.*

6.11–178 551.510.536:523.59

*Regener, Victor H., **Zodiacal light.** New Mexico. University. Dept. of Physics, Contract AF 19(604)-181, Final Report, Aug. 18, **1954.** 29 p. table, numerous diagrs., 6 refs. **MH-BH**—Forty-seven automatically produced maps of the zodiacal light obtained at Capillo Peak Observatory on 24 nights from March 1953 to May 1954 are reproduced and analyzed and data presented in tables. Results are found to be symmetrical with axis of ecliptic, with only slight anomalies. The intensity variation along the ecliptic is said to follow the power law with an exponent of 2.8 (average of 20 maps). Intensity was found to be 50% lower than Elvey and Roach (1937) and 30% lower than Roach found more recently. Treatment of background zodiacal light (undetermined in these results) may account for discrepancy. *Subject Headings:* **1. Zodiacal light charts 2. Capillo Peak Observatory, New Mexico.**—*M.R.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Proceedings** (Midwestern Conf. on Fluid Mechanics, 1st . . .; 3 d . . .), 6.11–2; **Atmos. studies of transfer fields** (Benton), 6.11–11; **Met. data presentation** (Benton), 6.11–12; **Numerical forecasting with barotropic model** (Bolin), 6.11–141; **Use of primitive equations of motion in numerical prediction** (Charney), 6.11–142; **Vorticity equation integration** (Thompson), 6.11–148; **Prognostic equations for mean motions** (Thompson), 6.11–149; **Mean meridional circulation in low latitudes** (Palmén), 6.11–202; **Pressure jump theory** (Tepper), 6.11–243.

6.11–179 551.511:551.551

Bénard, Henri and Avsec, Douchan (*Univ. of Paris*), **Travaux récents sur les tourbillons cellulaires et les tourbillons en bandes: applications à l'astrophysique et à la météorologie.** [Recent studies of cellular and linear eddies: astrophysical and meteorological applications.] *Journal de Physique et le Radium*, Paris, Ser. 7, 9(11):486–500, Nov. **1938.** 23 figs., 30 refs., 4 eqs. French summary p. 486. **DLC**—This is a classical paper on cellular turbulence with application to cloud "streets" or rows of cumulus or altocumulus, and to granular structure

f solar photosphere. The details of the original apparatus which the author used to demonrate the cellular behavior of convective turbulence in the laboratory are illustrated. *Subject leadings:* **1. Convective activity 2. Bénard cells 3. Turbulence theory 4. Cellular turbulence.** *—M.R.*

6.11–180 551.511:531.75:532.5

Benton, George S., **General solution for the celerity of long gravitational waves in a tratified fluid.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract Cwb 8374, 'echnical Report, No. 5, Nov. **1954.** 36 p. 3 figs., 7 refs., 40 eqs. **DWB**—The theory for he speed of long gravitational waves of infinitesimal amplitude in a multi-layered system of omogeneous fluids is extended to define a general equation for speed of such waves in a ontinuously stratified system. The solution is presented as an infinite series in arbitrary inctions describing the distribution of fluid density and kinematic energy with depth. *Subject leadings:* **1. Fluid dynamics 2. Gravity wave theory.**—*Author's abstract.*

6.11–181 551.511:551.513.1

Bjerknes, Jacob A. B., **Preliminary study of the day to day changes of angular momentum uring January–February and July–August 1949.** (In: California. Univ. at L. A. Dept. f Meteorology, Contract AF 19(122)-48, General Circulation Project, Final Report, March 5, **1955.** Article 11. 13 p. 7 charts (fold.), 2 tables, numerous eqs.) **DWB**—The equation or the local time derivative of atmospheric angular momentum is established. An approximate umerical testing of that equation is carried out for the two research periods Jan.–Feb. and uly -Aug. 1949 by using the geostrophic parts of the angular momentum and its meridional ux. Correlation between computed and observed changes of angular momentum are found o be significantly positive. Rather important second order terms, which will next be studied, ould improve the correlations. *Subject Heading:* **1. Angular momentum.**—*Author's abstract.*

6.11–182 551.511 536.25:532.5

Chandrasekhar, F. R. S. (*Yerkes Obs., Univ. of Chicago*), **The thermal instability of a uid sphere heated within.** *Philosophical Magazine*, London, 7th Ser., 43(347):1317–1329,)ec. **1952.** 2 tables, 9 refs., 82 eqs. **DWB**—In this paper the problem of the thermal inability of an incompressible fluid sphere heated within and in equilibrium under its own ravitation is considered. A general disturbance is analyzed into modes in terms of spherical armonics of various orders, l, and the criterion for the onset of convection for the first 15 odes is found both when the bounding surface is free and when it is rigid; and it is shown at in both cases the mode $l=1$ is the first to be excited. *Subject Heading:* **1. Thermal inability.**—*Author's abstract.*

6.11–183 551.511:551.551

Davies, R. W. (*Amer. Inst. of Aerological Res., Pasadena*), **Energy spectrum of turbulence or the entire range.** *Physical Review*, 95(4):912-913, Aug. 15, **1954.** 8 refs., 11 eqs. **DWB**— formula is presented for the wave number spectrum, derived from the Kolmogorov-Onsager-on Weizäcker limiting law for large Reynolds numbers and large ϵ; and the Batchelor-von Kárán-Lin limiting law for small Reynolds numbers, and small ϵ. The similarity to the black body adiation law is clearly brought out; namely that ϵ (the mean turbulent dissipation per unit olume and unit time) is analogous to the dissipation of temperature in black body radiation, nd hence similar to the energy spectra. *Subject Headings:* **1. Turbulence spectrum 2. Turulence decay.**—*M.R.*

6.11–184 551.511:551.510.53

Dedebant, Georges, **Determinación cuántica de la estratosfera.** ["Quantum" determinaion of the stratosphere.] *Meteoros*, Buenos Aires, 4(3):158–173, July/Sept. **1954.** 2 figs., umerous eqs. Spanish and English summaries p. 158. **DWB**—Global thermodynamics f the atmosphere signifies the thermodynamics of the mean atmosphere considered as a otality and permits the application of the principles of classical thermodynamics. It is hown how the vertical thermal structure of the atmosphere is derived from an integral number seven" which is the number of degrees of freedom necessary to attribute to an atmospheric

particle of air. The temperature and altitude of the tropopause, reheating above the tropopause and the variation of the stratosphere with latitude are calculated. The extension of the principles of global thermodynamics to atmospheric radiation permits the calculation of the theoretical solar constant. *Subject Headings:* **1. Thermodynamics of the atmosphere 2. Tropopause height 3. Tropopause temperatures 4. Global thermodynamics 5. Solar constant.** —*I.L.D.*

6.11–185 551.511:551.551

Estoque, Mariano A.; Benton, George S. and Kahn, Arthur B., **Two studies on the methodology of spectrum analysis.** Johns Hopkins Univ. Dept. of Engineering, Contract AF 19(122)-365, Scientific Report, No. 4, Sept. **1954.** 55 p. 9 figs., 11 refs., eqs. **MH-BH**—Methods of determining power and transport spectra of large scale atmospheric turbulence are investigated. It is found that when conventional techniques are employed, difficulties arise due to the tendency of the cross-correlation function to remain large and fluctuate irregularly at long lags. In the examples considered, determination of the spectrum itself was not feasible; however, definition of an "integrated spectrum" made it possible to evaluate the relative importance of different regions of the spectrum in the transport process. To eliminate some of the computational problems arising from the behavior of the cross-correlation function, a new technique of determining spectra is developed using an "averaging function." It is shown that this technique, although theoretically equivalent to standard methods, has significant computational advantages and reduces some of the difficulties previously encountered. *Subject Headings:* **1. Turbulence spectrum 2. Energy transport.**—*Authors' abstract.*

6.11–186 551.511

Fujita, Tetsuya, **New theory on convection problems.** *Tobata, Japan. Kyushu Institute of Technology. Meteorological Laboratory, Report,* 2(3), July **1952.** 157 p. 136 figs., 7 tables, 5 refs., numerous eqs. **DWB**—An integrated theory of convection and convection phenomena based on dynamics of air movements which result in buoyancy, vertical acceleration, etc., is presented. In separate chapters, the author takes up the resulting theory of: 1) upward acceleration, 2) mechanism of pressure propagation, 3) convection pressure and excessive pressure, 4) same in frontal zone, 5) vertical and horizontal acceleration, 6) air movement in field of acceleration, 7) vertical front with infinite straight edge, 8) approximation of formulas for large scale phenomena, 9) mechanism of typhoon formation, 10) buoyancy caused by arbitrary warm and cold area and 11) application to thunderstorm convection. *Subject Headings:* **1. Vertical acceleration 2. Buoyancy effects 3. Convection theory.**—*M.R.*

6.11–187 551.511:551.524:551.554

*Ito, N.; Okawa, T. and Kobayashi, T., **On the turbulence and the thermal equilibrium in the atmosphere near the ground surface.** *Journal of Meteorological Research,* Tokyo, 5(10/12):764–773, Jan. **1954.** 11 figs., 3 tables, 10 refs., eqs. In Japanese; English summary p. 764. **MH-BH**—The authors observed temperatures and wind velocities from the ground surface to the height of 45 m, and other thermal factors on the surface. From these data the eddy diffusivities were calculated by means of two independent methods, dynamical and thermodynamical. The result of the former is in good agreement with that of the latter in the daytime, but not at night. It seems that the stability of the atmosphere has a great influence upon the eddy diffusivity. From all the observed factors it is found that the energy of the solar radiation which arrives at the ground surface is alloted as the following: 15 to 18% is reflected to the sky, 25 to 30% conducts into the ground, 30 to 35% is spent on evaporation, and the residue conducts into the atmosphere. Observations were made on a radio tower at Retsuretsupu, Hokkaido, at the surface, 10 m, 23 m and 45 m height. *Subject Headings:* **1. Profiles of meteorological elements 2. Turbulent diffusion investigations 3. Tower observations 4. Retsuretsupu, Hokkaido.**—*Authors' abstract.*

6.11–188 551.511:551.551

*Köhler, Hilding, **Meteorological turbulence. Some consequences of the power law applied to the exchange coefficient.** *Uppsala. Universitet. Meteorologiska Institutionen, Meddelande,* No. 42, pub. **1955.** 20 p. 9 tables, 2 figs., 10 refs., 39 eqs. **DWB.** Reprinted

from *Vetenskaps-Societeten i Uppsala, Nova Acta*, Ser. 4, 16(1), [1954?] **DLC**—Since the simplified hydrodynamics equation of horizontal movement derived by the author in 1933: $\frac{d}{dz}\left(\eta\frac{dc}{dz}\right)=C+i\lambda\rho c$ [where $c=u+iv$ is the mean wind velocity independent of x and y but dependent on z] cannot be used at great heights in studies of turbulent wind profile, the results of DEACON, SUTTON, BATCHELOR and VON KÁRMÁN have been used to generalize this equation so that it will be valid to greater heights with decreasing values of modified Re number and increasing values of P. Constants are determined, potential temperature factor introduced and results tested graphically. Numerical values of constants for various latitudes are appended. *Subject Headings:* **1. Turbulent exchange coefficients 2. Wind profiles.**—*M.R.*

6.11–189 551.511:551.551

Lettau, Heinz, **Note on horizontal diffusivity for large-scale tropospheric currents.** *Journal of Meteorology*, 12(4):410–412, Aug. **1955.** 8 refs., 8 eqs. **DWB**—Commenting on a paper by Moore, C. B.; Smith, J. R. and Gaalswyck, **On the use of constant-level balloons to measure horizontal motions in the atmosphere.** *Ibid.*, 11:167–172, June 1954 (*see item* 6.2–118, Feb. 1954, *MAB*), LETTAU describes measurements of eddy wind components on manned balloons between 900 and 650 mb, which likewise gave eddy components $<10^6$ cm²/s. The basis of the estimate of 10^8 to 10^{10} cm²/s from moisture variations on isentropic surfaces is examined, and an alternative explanation by horizontal divergence, which would reduce it to 10^4–10^6 cm²/s is put forward. The initial separation of the balloon pairs in the determination by MOORE, SMITH and GAALSWYCH was too small for divergence to operate. *Subject Headings:* **1. Diffusion processes 2. Eddy diffusion.**—*C.E.P.B.*

6.11–190 551.511:551.547:551.515.11

McClain, E. Paul and Danielsen, Edwin F., **Zonal distribution of baroclinicity for three Pacific storms.** *Journal of Meteorology*, 12(4):314–323, Aug. **1955.** 6 figs., 12 refs., 10 eqs. **DWB**—The historical development of cross sections into baroclinic models is summarized. West–east sections from Pacific to Great Lakes for April 6–9, 1952, Jan. 21–22, 1951 and Jan. 30–31, 1952 up to 150 mb show isopleths of potential temperature and day-to-day changes. "Dominating features of the thermal field are two types of baroclinic zones: (1) broad and essentially non-frontal zones which form the leading and trailing edges of deep, rapidly moving cold domes in the middle and upper troposphere; (2) narrow, frontal type zones comprising the leading or trailing edges of either slowly-moving, low-level cold domes or rapidly moving, upper-level ones. There is evidence that the non-frontal baroclinic zones are equally as important, both dynamically and synoptically, as the frontal ones." *Subject Headings:* **1. Baroclinic fields 2. Trough structure.**—*C.E.P.B.*

6.11–191 551.511:551.513

*Mintz, Yale, **The mean geostrophic poleward flux of angular momentum and of sensible heat in the winter and summer of 1949.** California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(122)-48, Scientific Report, No. 7, July **1954.** 12 p. 2 figs., 4 tables, ref. **MH-BH.** Also his: **Final computation of the mean geostrophic poleward flux of angular momentum and of sensible heat in the winter and summer of 1949.** (In: *Ibid.*, Final Report, March 15, **1955,** Article 5. 14 p. 5 figs., 6 tables, 4 refs., 8 eqs.) **DWB**—In Report No. 7 the mean geostrophic poleward flux of angular momentum and of sensible heat is computed from daily Northern Hemisphere synoptic charts, from sea level to 100 mb, for a 59 day winter period and a 62 day summer period in 1949. In the Final Report daily circumpolar maps of the pressure and temperature fields at six levels in the troposphere and lower stratosphere were used to compute the longitude- and time-averaged geostrophic poleward fluxes of angular momentum and of sensible heat per unit vertical pressure increment and the sea level to 100 mb vertically integrated fluxes. The vertically integrated angular momentum flux reached its maximum at about latitude 32–33°N: 4.6×10^{16} and 1.3×10^{16} *l* m² s^{-2}, in winter and summer, respectively. The vertically integrated heat flux reached its maximum at about latitude 48–49°N: 5.0×10^{12} and 1.1×10^{12} *kj* s^{-1}, in winter and summer, respectively. *Subject Head-*

ings: **1. Geostrophic poleward heat flux 2. Angular momentum flux 3. Northern Hemisphere charts.**—*Author's abstract.*

6.11–192 551.511:551.513.1

Oi, Masamichi, **Distribution of horizontal divergence in a topographically perturbed zonal current.** Florida. State Univ. Dept. of Meteorology, Contract Nonr-988(01), Project NR 082 071, Technical Report (unnumbered), Aug. 15, **1954.** 30 p. 10 figs., 10 refs., 2 tables, eqs. **DWB**—In this report the author deals with an extension of his previous work on the distribution of horizontal divergence of an incompressible flow around a semi-circular infinite cylinder with no upper boundary (Oi, 1952) to a more realistic case of flow over a semi-elliptic infinite cylinder with no upper boundary and to two cases of flow with upper boundaries. In terms of these results, the upstream trough is interpreted by the so-called vorticity equation. *Subject Heading:* **1. Vorticity zonal perturbations.**—*Author's abstract.*

6.11–193 551.511:551.557:551.547

Smith, F. B., **Geostrophic and ageostrophic wind analysis.** *Royal Meteorological Society, Quarterly Journal,* 81(349):403–413, July **1955.** 7 figs., table, 10 refs., 7 eqs. **DWB**—The work done over the British Isles by the pressure field set up by differential solar heating of the earth's surface is estimated from the equations of energy and dissipation by kinetic forces, using the geostrophic and ageostrophic components of flow and radius of curvature computed from radiosonde ascents at 9 levels, 1000-100 mb. The mean total energy is 1.71×10^9 erg cm^{-2}. The rate of generation of kinetic energy is 4.95×10^3 erg cm^{-2} sec^{-1} by the Coriolis term and 3.85×10^3 by the centrifugal term, total 8.8. This is checked by computing life of a typical depression and found to be of the right order. *Subject Heading:* **1. Wind field analysis.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Atmos. studies of transfer fields** (Benton), 6.11–11; **Met. data presentation** (Benton), 6.11–12; **Numerical forecasting with barotropic model** (Bolin), 6.11–141; **Tropopause variations** (Hughes, Foster), 6.11–172; **Study of angular momentum changes** (Bjerknes), 6.11–181; **Mean geostrophic poleward flux of angular momentum** (Mintz), 6.11–191; **Horizontal divergence distribution** (Oi), 6.11–192.

6.11–194 551.513:551.509.3

*Matsumoto, S.; Itoo, H. and Arakawa, Akio (*Met. Res. Inst., Tokyo*), **On the horizontal transfer of angular momentum and its relation to the local zonal-index tendency on the 500 mb surface.** *Papers in Meteorology and Geophysics,* Tokyo, 5(2):134–143, Sept. **1954.** 13 figs., table, 10 refs. **MH-BH**—The geostrophic angular momentum transfer vector on the 500 mb level is calculated over the Far East. The angular momentum convergence in a sector of 10 degrees in latitude and 30 degrees in longitude is compared with the local zonal-index tendency in the same area. Good relation is found between them on the variation with a period of several days, but only 30% of the horizontal convergence of angular momentum appears in the local change. Also, 45-day mean angular momentum transfer vector is calculated. Its horizontal convergence shows a remarkable locality having such a value as suffices to cause the zonal velocity change 6 m sec^{-1} in a day. The eddy transfer has northward component almost everywhere in our region, but is smaller than the transfer due to mean wind. *Subject Headings:* **1. Angular momentum transfer 2. Zonal index.**—*Authors' abstract.*

6.11–195 551.513

Queney, P., **Les grands mouvements de l'atmosphère.** [Large scale movements of the atmosphere.] *La Météorologie,* 4th Ser., No. 35:195–207, July/Sept. **1954.** 7 figs. French, English and Italian summaries p. 195. **DWB**—The progress accomplished in the course of the last six years in the knowledge and explanation of the general circulation of the atmosphere represents a decisive step towards the rationalization of meteorology. It led in particular to the repudiation of the old "themic" theories in favor of "dynamic" ones. 1. Recall of our knowledge on the vertical distribution of heat sources and temperature; troposphere, hot

ayer, intermediary cold region; 2. General circulation up to 20 km; description, definition and unction of the jet-streams, evolution and formation of the anticyclones and great depressions, chematical description of the large vertical currents; 3. Dynamical explanation of the jet-reams; ROSSBY's theory; and 4. Probable function of the hot layer as an intermediary between he cosmic factors (particularly the solar activity) and the lower general circulation. Con-lusion: Necessity of a detailed investigation of the air motions in the hot layer, and of an ssociation of meteorology with astrophysics. *Subject Headings:* **1. General circulation . Large scale weather processes 3. Anticyclones 4. Vertical currents 5. Jet stream.**—*Author's abstract.*

6.11–196 551.513.1:551.515.11

Lorenz, Edward N., **Displacement and intensification associated with variations of local ngular momentum.** *U. S. Air Force. Cambridge Research Center, Geophysical Research apers*, No. 24:19–25, Nov. **1953.** 7 refs., 21 eqs. *AFCRC Technical Report* 53–35. **DWB, DLC**—The rate of change of the total angular momentum within a cylinder about an arbitrary ertical axis results largely from the horizontal transport of angular momentum across the ertical boundary of the cylinder. This transport may be resolved into the transport due o the mean wind, i.e., the wind averaged vertically with respect to pressure, and the departure f the total transport from the transport due to the mean wind. The case is presented for egarding such a resolution as a resolution into displacement and intensification. *Subject leadings:* **1. Cyclone theory 2. Angular momentum.**—*Author's abstract.*

6.11–197 551.513.1

Palmén, E., **On the mean meridional drift of air in the frictional layer of the west-wind elts.** *Royal Meteorological Society, Quarterly Journal,* 81(349):459–461, July **1955.** fig., tables, 9 refs., 4 eqs. **DWB**—In 40–50°N there is poleward drift (0.42 m/s) over the oceans n July but none in Jan. In 40–50°S there is poleward drift (0.9–1.0 m/s) in both months. t is concluded that the mean zonal stress in 40–50°N is constant in Jan. but decreases with eight in July. In 40–50°S it decreases with height in both months. The difference is at-ributed to differences in surface drag and vertical wind shear. *Subject Heading:* **1. Meridional irculation.**—*C.E.P.B.*

6.11–198 551.513.1:551.557:551.510.536

Stenz, Edward, **The upper east wind of Copernicus.** *Acta Geophysica Polonica,* Warsaw, (2):72–81, **1953.** 7 refs. In English; Polish summary p. 81. **DWB**—This is a discussion f the little known remark of COPERNICUS, in his work **De revolutionibus Orbium Celestrum,** elative to atmospheric circulation caused by the rotation of the earth. Author quotes the tatement and asks: does the upper easterly wind caused by the non-participation of the ighest atmospheric layers in the rotation of the earth ("Copernicus' wind") really exist? lthough aerological investigation and observation of volcanic dust, meteoric traces and radio stronomical data concerning the E and F layers of the ionosphere do not indicate the presence f easterly winds in the upper layers, the author takes notice of the phenomenon of counterglow n the midnight sky discovered by HUMBOLDT and investigated by HOFFMEISTER and ASTA-OVICH which suggests that the structure of the external layers of the earth's atmosphere is rregular, i.e., a strip of rarefied atmospheric gases extending in a direction opposite to the sun. Between this strip, called by FESENKO "the gaseous tail of the earth," and the rest of the tmosphere (taking part in the rotation movement of the earth) a band must exist which ould comprise the upper east wind of COPERNICUS. *Subject Headings:* **1. "Copernicus ind" 2. Upper air east wind 3. Rotation of the earth 4. Gaseous tail of earth's atmosphere . Counter-glow.**—*A.M.P.*

6.11–199 551.513.2:551.515

Graham, Roderick D., **An empirical study of planetary waves by means of harmonic nalysis.** *Journal of Meteorology,* 12(4):298–307, Aug. **1955.** 9 figs., table, 14 refs. **DWB**—he latitude variation of the smoothed circumpolar 17,800 ft contour of the 500 mb surface mostly near 47°N) was analyzed into 12 harmonics for normal position and for each day of

Jan. 1952. The sum of the first three represents the basic flow, isopleths giving a trough- and ridge-type diagram. The "amplitude spectrum" of the harmonics for each day represents the state of the upper westerlies on that day. Relations of circulation changes to displacements of harmonic waves are discussed. Discontinuous motions of waves represent perturbations; harmonics above the third all showed eastward motion. *Subject Heading:* **1. Waves in the westerlies.**—*C.E.P.B.*

6.11–200 551.513.1:551.515:532.5

Kao, Shih-Kung, **Wave motion in a rotating Couette flow of a viscous fluid.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract AF 19(604)-916, Scientific Report, No. 1, Dec. **1954.** 22 p. 2 figs., 2 refs., 28 eqs. **DWB**—With the assumption of non-divergent horizontal flow a certain class of solutions of the non-linear hydrodynamical equations are obtained for a viscous Couette flow on an earth whose variation of Coriolis parameter with latitude is constant. These solutions yield waves of transient type, of which the amplitude, wave velocity, and the inclination of the trough and ridge lines vary with time. For Couette flow with both lateral and vertical velocity-shears the vertical profile of the amplitude of the waves can either be exponential in z or independent of z, whereas for Couette flow with only lateral velocity-shear the amplitude may be independent of z, a sinusoidal function of z, or a hyperbolic sine or cosine of z. These waves will eventually disappear in a Couette flow whether the fluid is viscous or not, although under certain conditions waves may be amplified within a certain time interval. Pressure field, geostrophic deviation, and meridional transports of westerly momentum and energy are obtained for such a flow system. For reasonable values of the constants for atmospheric systems the geostrophic deviations have been estimated, and may differ from the actual wind speed by one order of magnitude. *Subject Headings:* **1. Couette flow 2. Waves in the westerlies.**—*Author's abstract.*

6.11–201 551.513.2:551.557

Lee, R., **Synoptic evidence for a direct circulation about a jet stream.** *Royal Meteorological Society, Quarterly Journal,* 81(349):462–468, July **1955.** 5 figs., 11 refs. **DWB**—The existence of an upward branch of a direct thermal circulation above a jet stream in the entrance region is corroborated by 300 mb charts and sections in N. America on Nov. 1, 1953. The local upward velocity of the tropopause is about 2 cm/s. Below the jet stream there is descent. *Subject Heading:* **1. Jet stream structure.**—*C.E.P.B.*

6.11–202 551.513.2:551.511

Palmén, E., **On the mean meridional circulation in low latitudes of the Northern Hemisphere in winter and the associated meridional and vertical flux of angular momentum.** California. Univ. Dept. of Meteorology, Contract AF 19(122)-48, Scientific Report, No. 9, Dec. **1954.** 41 p. 7 figs., 5 tables, 19 refs., 25 eqs. **DWB**—Vertical transfer of angular momentum in the northern trade-wind zone; computation of mass transport in Hadley cell from wind observations; shearing stresses and vertical eddy flux of momentum in the trade wind zone and total budget of angular momentum in latitude strips of northern trade wind belt comprise the main subjects treated in this empirical theoretical study leading to calculations of actual transport during Jan. and Feb. 1952 based on data from 19 selected stations around lat. 13°N (8 ocean stations). *Subject Headings:* **1. Meridional circulation 2. Momentum transport 3. Angular momentum 4. Northern Hemisphere.**—*M.R.*

6.11–203 551.513.2:551.557

Van der Ham, C. J., **De straalstroom.** [The jet stream.] *Hemel en Dampkring,* 52(11): 201–210, Nov. **1954.** 10 figs. **MH-BH**—The author discusses the properties of the jet stream including its horizontal and vertical boundaries and its wind velocities, the geographical position of the jet stream, the relation between jet stream and depressions, weather and the jet stream and the relation between the jet stream and turbulence in the free atmosphere. The discussion is nontechnical and is accompanied by a number of very good diagrams. *Subject Headings:* **1. Jet stream 2. Jet stream turbulence.**—*I.L.D.*

ATMOSPHERIC DISTURBANCES

See also: **Proceedings** (UNESCO Symposium on Typhoons), 6.11–1; **Studies on tropical cyclones** (Prudhomme, Valtat), 6.11–14; **Study on tropical disturbances** (Prudhomme), 6.11–15; **Weather radar evaluation** (Harrison), 6.11–104; **Report on numerical prediction over Far East** (Japan. Numerical Prediction Group), 6.11–144; **Dynamic linkages** (Wexler), 6.11–151; **Tornado forecasting parameters** (Barnett), 6.11–159; **Angular momentum** (Lorenz), 6.11–196; **Empirical study of planetary waves** (Graham), 6.11–199; **Waves in the westerlies** (Kao), 6.11–200; **Atmospheric oscillations** (Donn et al.), 6.11–240; **Mach lines and pressure-jump lines** (Freeman), 6.11–241; **Floods of 1954** (Nelson), 6.11–315.

6.11–204 551.515

Iida, M. and Kubota, S. (*Met. Res. Inst., Tokyo*), **Mean spectra of various mean values.** *Papers in Meteorology and Geophysics*, Tokyo, 5(2):189, Sept. **1954.** fig., ref. **DWB**—Spectra of 1, 5, 10 and 30 day mean values of frequency of waves in westerlies from 500 mb pressure charts at 50°N (May 1951) are computed and shown in comparative graphs. Little difference was found between 25 and 30 day mean values. In all spectra little difference was found between $N=1$ and 2, but a marked dip to $N=3$. Anomalous maximum of $N=6$ in 1 and 5 day mean values disappears in 10 day spectrum. For 15 day or more means the variations can be determined from $N=1$ and 2 components. Distribution of disturbance energy generated by baroclinic effect has a maximum at $N=6$. *Subject Heading:* **1. Wave spectra for 500 mb westerlies.**—*M.R.*

6.11–205 551.515

†U. S. Weather Bureau, **Causes and characteristics of thunderstorms and other atmospheric disturbances. Interim Reports, No. 5 and 6. Submitted in accordance with Public Law 756, 80th Congress.** Wash., D. C., June 1953 and June **1954.** 31+40 p. 24+49 refs. **DWB**—Report No. 5 contains a summary of the research being conducted by the U. S. Weather Bureau, including meteorological studies of air terminals, in particular that concerned with visibility measurements, cloud height variations and evaluation of remote instrumental methods; clear air turbulence, synoptic high altitude turbulence observations and hail; research on tornadoes and squall lines covering forecasting, pressure-jump line investigations and radar storm detection; artificial weather control, cloud physics and hurricanes. Report No. 6 summarizes progress on the topics that have just been cited and in addition the progress of research on solar and radiation effects on the atmosphere and on singularity studies. *Subject Headings:* **1. Atmospheric disturbances 2. Progress in meteorology.**—*I.L.D.*

6.11–206 551.515.1:551.541

Le onde barometriche nella realta e . . . nella fantasia! [Barometric waves in reality and . . . in fantasy!] *Geofisica e Meteorologia*, Genoa, 2(3/4):75–76, May/Aug. **1954. MH-BH**—A very critical comment on an article by Ferrucio Mosetti (*Annali di Geofisica*, 7:482–489, **1953**) who maintains that the directions of origin of individual waves recorded by the microbarograph corresponds to the position of cyclones with reference to the recording station. The critic points out that the microvariations of atmospheric pressure are caused by local conditions, especially winds over the recording stations. *Subject Headings:* **1. Barometric depressions 2. Pressure microvariations 3. Reviews.**—*I.L.D.*

6.11–207 551.515.12:551.577

*Reiss, Gunther, **Composite analysis of cyclonic precipitation in the Eastern United States.** New York Univ. College of Engineering. Research Division, Contract Nonr-285(09), Technical Paper, No. 3, April **1955.** 35 p. 8 figs., 3 tables, 8 refs., 2 eqs. **DWB**—Composite six-hourly precipitation maps are presented for twenty extratropical cyclones in the eastern United States. The cyclones have been separated into two groups, one consisting of cyclones which developed in high latitudes and moved eastward, the other of cyclones which developed in low latitudes and moved northeastward. The life histories of the two precipitation distributions are shown in two series of composite maps. Confidence limits on the composite precipitation maxima are provided. *Subject Headings:* **1. Cyclonic precipitation 2. Extratropical cyclones 3. Eastern United States.**—*Author's abstract.*

6.11–208 551.515.11:551.515.21

*Desai, B. N. and Rao, Y. P. (*both Regional Met. Centre, Bombay*), **Some aspects of depressions and cyclones in the Indian seas.** [In: UNESCO Symposium on Typhoons, Tokyo, Nov. 9-12, 1954, **Proceedings.** pub. **1955.** p. 175-198.] **DWB**—The earlier studies on depressions and cyclones in the Indian seas were either based on sea-level data or from the point of view of air masses in such systems from the available upper air data. RIEHL's work on the Pacific typhoons and Atlantic hurricanes has drawn attention to the role of troughs in the westerlies and upper tropospheric disturbances in the tropics itself on the formation of tropical storms. The upper air conditions at the time of formation of nine depressions or cyclones in the Indian seas have been discussed in the present paper. In four cases depressions or storms formed under the regime of upper tropospheric northerlies in the eastern portion of a high. In two of these cases there is positive evidence of inphase superposition of a high in the westerlies on the high in the low latitudes. In four other cases the formation seems to have taken place as a result of the interaction of the troughs in westerlies with the tropical perturbations. In one case, however, available data did not show that conditions at the time of formation were similar to the models put forward by RIEHL. In this case strengthening of south winds and development of cyclonic shear preceded the formation of the depression. Extension of the westerly belt into the area of the subtropical high seems to be a precursor to recurvature of depressions and cyclones. Such extension is helped when a trough in the westerlies is affecting Indian latitudes. The divergence in the forward portion of upper tropospheric troughs in the westerlies also seems to influence recurvature of depressions, when they are sufficiently near. VENKATARAMAN noticed subsidence in the field of seven depressions or cyclones. The subsiding air was coming from the inner storm area where it had ascended earlier. Two cases of marked subsidence were at the cyclonic storm stage at distances between 130 and 260 mi from the center. In one depression subsidence occurred within 30 mi of the center. With reference to the direction of movement of the depression or cyclone, in only one case subsidence was in the rear; in the others, it was in the forward portion. *Subject Headings:* **1. Cyclogenesis 2. Indian seas.**—*Authors' abstract.*

6.11–209 551.515.11

Estoque, M., **An investigation of cyclone development, storm no. 3.** Chicago. University. Dept. of Meteorology, Contract AF 19(604)-390, Technical Report, No. 17, Oct. **1954.** 30 p. 8 figs., table, 5 refs. **DWB**—A selected case of cyclogenesis over the United States is analyzed. It is shown that the cyclone development near sea level may be anticipated by considering the vorticity advection aloft and the patterns of thermal advection between the level of nondivergence and the surface. The distributions of vertical velocity and horizontal divergence during the development have been investigated and compared with the patterns of clouds and precipitation. *Subject Headings:* **1. Cyclogenesis 2. Cyclone development.**—*Author's abstract.*

6.11–210 551.515.11

Meyer, H.-K., **Über das Verhalten spezieller Kaltlufttropfen.** [The behavior of special cold lows aloft.] *Berlin. Freie Universität. Institut für Meteorologie and Geophysik, Meteorologische Abhandlungen,* 2(3):91–98, **1954.** 8 figs., table. **DWB**—A description of the rapid dissolution of a cold low aloft which remained for a long time in the Polar regions, reached the extreme north of North America on Oct. 13, 1952 and in the course of a week migrated to the Great Lakes region without any change of intensity. The rapid dissolution of the cold low aloft within 24 hrs occurs without any corresponding cyclogenesis at the surface and is largely the result of adiabatic warming. *Subject Heading:* **1. Cold lows aloft.**—*I.L.D.*

6.11–211 551.515.4:551.576.12

§Nakayama, A., **Influence of cumulus on thunderstorm development.** *Journal of Meteorological Research,* Tokyo, 6(1/3):38–46, March **1954.** 8 figs., 9 tables, 15 refs., 6 eqs. In Japanese; English summary p. 38. **MH-BH**—It is a well-known fact that cold air in the upper layer plays an important role in the development of thunderstorms. In the present paper the reason why thunderstorms do not develop all over the region having the above mentioned condition is discussed in relation to antecedent cumulus conditions. Surface,

0 mb, 300 mb charts, time cross sections, space cross sections, adiabatic charts and other agrams and data accompany the text. *Subject Headings:* **1. Thunderstorm development Cross sections 3. Cumulus cloud effects.**—*Author's abstract.*

6.11–212 551.515.83(261)

Hinkel, C. H. and Saunders, W. E., **Speed of movement of warm fronts on the Atlantic.** *eteorological Magazine*, London, 84(998):241–244, August **1955.** 2 figs., table, ref. **DWB**— study of motion of 52 selected warm fronts over the ocean in relation to geostrophic wind eeds gave the relations $u_F = 0.84\, u_J$ and $u_F = 0.99\, u'_J$, where u_F is speed of front, u_J and u'_J e geostrophic flows normal to front at front and 75–100 naut mi ahead. Correlations were 87 and 0.92. *Subject Headings:* **1. Frontal movement 2. Warm fronts 3. North Atlantic.** *C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Solar energy research** (Daniels, Duffie), 6.11–19; **Frequency distribution of auroral intensity** (St. Amand, Ashburn), 6.11–358.

6.11–213 551.521:536.33

King, Jean I. F., **A potential-theory formulation of radiant-heat transfer.** *Royal Meorological Society, Quarterly Journal*, 81(349):414–417, July **1955.** table, 25 eqs. **DWB**— ne radiant-heat flux in a homogeneous atmosphere constitutes an irrotational vector field. s a consequence, the flux can be represented as the gradient of a suitably-defined radiant-heat otential. This potential is shown to be a functional of the product of the radiant-source nction at all points in the atmosphere and an attenuation factor to allow for the absorption the intervening medium. The formalism is independent of the choice of coordinate system. ne familiar equations of radiant transfer, such as the Milne-Schwarzschild equilibrium uation, are deducible as special cases for the particular geometry of the plane-parallel mosphere. Most importantly, the radiant heating at an arbitrary point is expressed as a nctional of the second derivative of the Planck intensity. This radiant-heat flow equation ll form the basis for the construction of a new atmospheric radiation chart. *Subject Heading:* **Radiant energy transfer.**—*Author's abstract.*

6.11–214 551.521.14

†Lauscher, Friedrich, **Sonnen- und Himmelsstrahlung im Meer und in Gewässern.** [Sun d sky radiation in sea and in bodies of water.] *Handbuch der Geophysik*, Berlin, 8(4):723–8, **1955.** tables, diagrs., 32 refs., eqs. **DWB**—A systematic mathematical presentation the physical laws underlying the phenomena of the refraction of solar and sky light in bodies water and of the most important methods of measurement. The discussion includes the netration of radiation energy into water and air; refraction indices; reflection of solar radiaon from a water sphere; daily variation and daily totals of solar radiation reflection; reflection radiation issuing from the water; reflection at the bottom of the water; reflections from water rfaces set in motion by waves; observations of reflection absorptions and penetration of diation into water; absorption and diffuse reflection from suspended particles; scattering by solutely pure water; absorption by pure water; absorption of dissolved substances; total tinction; refraction of the primary and of the secondary light from below; methods of easurement and some results of spectral measurements. *Subject Headings:* **1. Albedo of sea Radiation measurement 3. Sky radiation.**—*I.L.D.*

6.11–215 551.521.14:551.573:551.311.12

Schieldrup Paulsen, Herfinn, **Solstrålingens betydning for smeltning av sne og is.** [The gnificance of solar radiation for melting of snow and ice.] *Naturen*, Bergen, 79(3):66–73, **55. DLC**—Glacial heat economy is discussed briefly. HOINKES and UNTERSTEINER's ld observations in the Swiss Alps, Aug. 21–31, 1950 and Sept. 3–9, 1951 show that ablation controlled by the absorption of short wave solar and sky radiation was 81.0 and 58.2%,

respectively. Nocturnal radiation was positive when measured under a low, dense cloud cover. The estimated albedo, varying from 0.405 to 0.338 indicate a distinct diurnal variation. Direct measurement of the radiation balance is suggested. *Subject Headings:* **1. Albedo of glaciers 2. Glacial ablation 3. Swiss Alps.**—*W.N.*

6.11–216 551.521.3

Arkhangel'skiĭ, M. M., **Nekotorye opytnye dannye ob oslablenii sveta v dispersnoĭ srede s krupnymi vzvesiiami.** [Experimental data on the extinction of light in a disperse medium with large suspensions.] *Akademiia Nauk SSSR, Doklady*, 97(1):73–76, July 1, **1954.** 3 figs., table, 7 refs. **DLC**—The author presents experimental data on the coefficient of extinction in suspensions of quartz sand, the grains of which have diameters of 70 to 170μ, both for single and multiple component dispersions. The coefficient was measured by means of a photoelectric calorimeter. The dependence of the coefficient of extinction upon the concentration and size of the particles, and the dependence of the coefficient of extinction of a two and three component mixture upon the relative content of the components are presented graphically. *Subject Heading:* **1. Extinction coefficient.**—*I.L.D.*

6.11–217 551.521.31:551.576:551.578.46

Petherbridge, P., **The brightness distribution of the overcast sky when the ground is snow-covered** *Royal Meteorological Society, Quarterly Journal*, 81(349):476–478, July **1955.** fig., 3 refs., 2 eqs. **DWB**—The distribution of brightness of a densely overcast sky was measured at Garston on Jan. 4, 1955, after snowfall. Albedo of snow 80%, mean direction of sun nearly S, elevation 15°. Brightness in foot-lamberts varied from 200 near zenith (B_z) to 80 on southern and eastern horizon. Averages were fitted by $B_\theta = \frac{1}{2}B_z(1+\cos\theta)$, θ = zenith angle. *Subject Headings:* **1 Sky brightness 2. Snow cover effects 3. Garston, England.**—*C.E.P.B.*

6.11–218 551.521.32:551.521.61

Anthony, Romuald (*U. S. Naval Ordnance Test Station, Inyokern, Calif.*), **Brief description of work on the infrared transmission of the earth's atmosphere.** *Société Royale des Sciences de Liége, Mémoires, Ser.* 4, 12(1/2):161–163, **1952.** **DLC**—Data obtained at Table Mountain, Calif., (7500 ft) in 1.5 to 25μ band. Water vapor absorption coefficients were obtained from measured absorption coefficients and compared with similar coefficients obtained from ELSASSER's (1938) formula (for standard pressure and temperature) showing that the theoretical curve fell above the experimental and the difference sometimes amounted to a factor of 2. The validity of LAMBERT's law is examined and found to be good to 7.0 cm of precipitable water. Between 10 and 13μ the curve of absorption coefficient vs. cm of precipitable water remains close to a straight line (almost constant) for all values of the optical path. For 8–10μ it rises sharply as the optical path approaches 0. Solar radiation beyond 10μ is above that of a blackbody radiator at 6000°K. *Subject Headings:* **1. Infrared absorption 2. Water vapor absorption spectra 3. Table Mountain, Calif.**—*M.R.*

6.11–219 551.521.4:535.33:546.33

Bricard, J. and Kastler, A., **Sur l'altitude de la couche luminescente de sodium dans la haute atmosphère. Critique de la méthode zénith-horizon.** [Height of the luminous sodium layer in the upper atmosphere and criticism of the zenith-horizon method.] *Société Royale des Sciences de Liége, Mémoires, Ser. 4*, 12(1/2):87–96, **1952.** 3 figs., 9 refs. **DLC**—A systematic error is shown to occur in the height determinations of the twilight D layer luminescence by the zenith-horizon method, in case there is a continuous distribution of sodium atoms. Heights thus calculated are too great. *Subject Headings:* **1. Emission layer heights 2. Sodium layer heights 3. Twilight emission measurements.**—*M.R.*

6.11–220 551.521.4

†Pavlova, E. N.; Rodionov, S. F. and Sholokhova, E. D., **Raspredelenie energii v spektre svetimosti nochnogo neba.** [Energy distribution in the light spectrum of the night sky.] *Akademiia Nauk SSSR, Doklady*, 98(5):769–771, Oct. 11, **1954.** fig., 13 refs. **DLC**—The

ergy distribution of the light spectrum of the night sky was measured by the electrophotoetric method. The results of measurements of: 1) the ultraviolet region 320–360 mμ; the green region 557.7 mμ; 3) the Meinel region 750–790 mμ; and 4) the Krasovskiĭ region 0–1075 mμ are presented. The calculated magnitudes of intensity of illumination of the night y in erg/cm sec ster are as follows: interval 540–570 mμ—1×10^{-4}; 320–360 mμ—1×10^{-4}; 0–900 mμ—3×10^{-3} and 900–1075 mμ—1.10^{-2}. *Subject Headings:* **1. Night airglow 2. Light ectra.**—*I.L.D.*

6.11–221 551.521.61

Fleischer, Richard and Gräfe, Kurt, **Die Kälteperiode vom 30.1 bis 10.2.1954 im Spiegel r Ultrarotstrahlung.** [Infrared radiation during the cold period from Jan. 30–Feb. 10, 54.] *Annalen der Meteorologie,* 6(7/8):220–231, **1953/54.** 10 figs., 11 refs. **MH-BH**—bservations of infrared radiation balance were made in Hamburg in a period of mainly E nds. The setup of the SCHULZE apparatus is described. The relation between infrared liation and weather is discussed including the effect of a snow cover. Curves show for ferent days the global radiation, radiation balance, temperature, cloudiness, state of ground d precipitation. The radiation balance was positive by day and small, negative by night. *bject Headings:* **1. Infrared radiation 2. Cold periods 3. Hamburg, Germany.**—*C.E.P.B.*

6.11–222 551 521.61(54)

Ramdas, L. A. (*Dir. Agr. Met., Met. Off., Poona*), **Studies on the infra-red radiation from e atmosphere at Poona, India.** *I.U.G.G. Association of Meteorology, Brussels, 1951, ocès-Verbaux des séances, Mémoires et discussion,* Dec. **1953.** p. 202–206. 24 refs., 3 eqs. **WB**—A special observatory at Poona has been engaged in long wave radiation research ce 1932. A list of 22 research papers, published by the author and collaborators, covers st hazards, nocturnal radiation, ultraviolet transparency of the atmosphere, soil temratures, solar radiation, precipitable water, infrared spectrum, microclimatology, etc. rrent activities are outlined. *Subject Headings:* **1. Infrared radiation 2. Meteorological servatories 3. Poona, India. I. Poona, Central Agricultural Meteorological Observatory.** *A.A.*

6.11–223 551.521.63

Baum, William A. and Dunkelman, Lawrence (*both, Naval Research Lab., Wash., D. C.*), **orizontal attenuation of ultraviolet light by the lower atmosphere.** *Optical Society of America, urnal,* 45(3):166–175, March **1955.** 9 figs., table, 50 refs., eqs. **DLC**—The horizontal enuation of ultraviolet light by the air near the ground was determined as a continuous nction of wavelength from 2300 to 4600Å. Measurements were made by means of photoaphic spectro-photometry on seventy-eight nights during 1949 at Pasadena, California, d also on three nights during 1950 at Washington, D. C. The results are given in the form a table of attenuation coefficients (km^{-1}) at selected wavelengths and in the form of repentative spectral attenuation curves for conditions ranging from fog to exceptionally clear . Except for weak oxygen absorption bands between 2431 and 2700Å, the attenuation efficient was found to vary quite smoothly (though differently) with wavelength on all ghts. Air pollutants, though frequently present, were not spectroscopically identified cept for sulfur dioxide, which was encountered in measurable concentration in Washington. one concentrations could be estimated from a few spectra obtained in exceptionally clear ather. *Subject Headings:* **1. Radiation attenuation 2. Ultraviolet light.**—*Authors' abstract.*

6.11–224 551.521.63:551.521.4

Chamberlain, Joseph W. (*Yerkes Observatory*), **The ultraviolet airglow spectrum.** *Astrosical Journal,* Chicago, 121(1):277–286, Jan. **1955.** 4 figs., 2 tables, 33 refs. **DWB**—spectrum of the ultraviolet airglow has been obtained with high dispersion (23 A/mm) d superior resolution. The rotational structure, which is clearly resolved except near the nd heads, shows conclusively that most of these airglow bands arise from the forbidden erzberg system of O_2. Longward of 3600Å the starlight continuum becomes noticeable d in the blue tends to obscure the O_2 emission. A few emission features remain unidentified. he relative intensities of the bands, the excitation of the upper state, the rotational tem-

perature, and the importance of de-exciting collisions in the emitting region are discussed. *Subject Heading:* **1. Ultraviolet airglow spectrum.**—*Author's abstract.*

6.11–225 551.521.63:551.510.53

Pressman, Jerome (*U. S. A. F. Cambridge Res. Center, Mass.*), **The latitudinal and seasonal variations of the absorption of solar radiation by ozone.** *Journal of Geophysical Research*, 59(4):485–498, Dec. **1954.** 23 figs., table, 13 refs., 15 eqs. **MH-BH**—A calculation is made of the latitudinal and seasonal variation of ozone absorption broken up into two phases. First this calculation is made for constant ozone distribution over the earth to display the effect of length of day and solar altitude factor. Then the calculation is made of an ozone distribution which varies with latitude in accordance with Götz. The calculations are based on extension of Craig's curve of E^N_z/n (E^n_z—energy absorbed by unit volume per second of solar radiation after passing through N cm of O_3 NTP; n—concentration of O_3). The energy absorbed during twilight in northerly latitudes is also included in the calculations. The results indicate that the length of day and solar altitude factor are sufficient to give the major features of the ozone solar absorption. *Subject Headings:* **1. Ozone absorption 2. Seasonal ozone absorption variations 3. Ozone distribution.**—*Author's abstract.*

6.11–226 551.521.

Smyth, M. J., **Photoelectric investigations of solar corpuscular radiation, Pt. 2.** *Royal Astronomical Society, Monthly Notices*, 114(5):503–513, **1954.** 6 figs., 3 tables, 5 refs. **DWB**—Further spectrograph observations confirm that "absorption in the violet wing, corresponding to particles approaching with speeds between 750–1150 km/sec, does not exceed ½% at any time following moderately intense flares. There is also little evidence of absorption of this magnitude associated with sequences of recurrent geomagnetic storms." (For Pt. 1, *see* 6.6–216, June 1955, *MAB.*) *Subject Heading:* **1. Corpuscular radiation.**—*From author's abstract.*

6.11–227 551.521.7:621.396.8:523.7

Wild, J. P., Roberts, J. A. and Murray, J. D., **Radio evidence of the ejection of very fast particles from the sun.** *Nature*, London, 173(4403):532–534, March 20, **1954.** 3 figs. 6 refs. **DLC**—The critical frequency hypothesis is applied to Type III bursts (fast drift duration 5–10 sec) attributed to corpuscular ejections from the sun at one-fifth the speed of light. Several hundred were recorded on 40–240 Mc/s in Aug. 1952-Aug. 1953. Dynamic spectra are shown including "harmonic pairs." Derived motions in the solar atmosphere are plotted as coronal height against time. These moving disturbances are explained as coronal streams, possibly of cosmic rays. Simultaneous emission of slow (230 km/sec) Type II outbursts and fast (10^5 km/sec) Type III clusters from the lower corona are discussed. *Subject Headings:* **1. Radio noise 2. Solar flares.**—*C.E.P.B.*

TEMPERATURE

See also: **Frost prevention in vineyards** (Baier), 6.11–10; **Turbulence and thermal equilibrium in atmos. near ground** (Ito, et al.), 6.11–187; **Snow density** (Lowry), 6.11–308; *see also* special bibliography on **Cooling power and its measurement,** p. 1622.

6.11–228 551.524:612.014.43:551.586

†Craig, F. N.; Garren, H. W.; Frankel, H. and Blevins, W. V. (*all from Chemical Corps Medical Lab., Army Chemical Center, Md.*), **Heat load and voluntary tolerance time.** *Journal of Applied Psychology*, Wash., D. C., 6(10):634–644, April **1954.** 4 figs., 4 tables, 25 refs., 4 eqs. **DLC**—The use of the heat load as a guide to heat tolerance was tested on six trained and acclimatized young men walking daily on a treadmill under various conditions of clothing, metabolic rate, room temperature and humidity. Each man worked as long as he could tolerate the conditions, thus defining a voluntary tolerance time (Th) in hours for these conditions. Observations on heart rate, sweat production and body temperature made during each walk were correlated with tolerance time. The best correlative of tolerance time was the heat load (Sa in cal/m²). It was concluded that each man could tolerate a characteristic

t load that was independent of the rate of heat storage (S in cal/m²/hr); or Sa = S×Th, ere Sa has a standard deviation of about 12 and a mean value for each man from 36–63. the high temperature series the range was from 58–114. *Subject Headings:* **1. Heat tolerance Temperature effects 3. Working capacity.**—*Based on authors' summary.*

6.11–229 551.524:551.311.181

*Fukutomi, Takaharu, **Relation between the beginning date of freezing and air temperature the coasts of the Okhotsk Sea, the Japan Sea and the Arctic Sea (Study of sea ice, the 19th port).** *Low Temperature Science, Sapporo, Japan, Ser. A, Physical Sciences,* 11:87–94, 53. 3 figs., table, 6 refs., 7 eqs. In Japanese; English summary p. 94. **DWB**—The ation between the observed beginning date of freezing in the coastal water of the Okhotsk , the Japan Sea and the Arctic Sea and the corresponding air temperature was investigated, l the equation: $X^2 = 2\pi\phi(+O)t = 2t\int_0^\infty R(\tau)d\tau$; which was derived theoretically in the "Study Sea Ice" (the 3rd Report, *see item* 5A-164, Jan. 1954, *MAB*), was found applicable in the t approximation. The fact that the time interval between the calculated date at which decreasing air temperature reaches the freezing point of sea water and the observed date commencement of freezing lies in the range of 16± 16 days, being variable with the mean pth of the coastal water mass and with the wind velocity, was ascertained. *Subject Headings:* **Sea ice 2. Sea ice forecasting 3. Air temperatures 4. Okhotsk Sea 5. Japan Sea Arctic Ocean.**—*Author's abstract.*

6.11–230 551.524:551.583:581.056

†Schove, Derek Justin (*St. David's College, Beckenham, Eng.*), **Summer temperatures and e-rings in North-Scandinavia, A.D. 1461–1950.** *Geografiska Annaler,* Stockholm, 36(1/2): 70, **1954.** 2 figs., tables, foot-refs., Chronology p. 65–76, bibliog. p. 78–80. **DLC**—A ighted mean index of tree growth is calculated and is compared with documentary data on mperature patterns of individual summers from 1461 to 1949. The author discusses the ationship between tree ring growth and summer temperature, based on studies in Alaska, rth Sweden and North Norway, mean growth as a climatic index, the method of calculating ighted growth and the relationship between tree ring growth and crop harvests in Scandinavia, land, Northern and Eastern Europe from 1461 to 1953. *Subject Headings:* **1. Summer mperatures 2. Tree ring growth 3. Climatic indexes 4. North Scandinavia.**—*I.L.D.*

6.11–231 551.524:551.506:69

Thomas, Morley K. (*Met. Div., Toronto*), **Method for determining winter design tem-atures.** *National Research Council of Canada. Div. of Building Research, Research Paper,* . 16, May 1955. Reprint from *Heating, Piping and Air Conditioning,* Chicago, May **1955,** 155–158. 5 figs., 2 tables. Price: 10 cents. **DWB, DLC**—The method is based upon the obable frequency of occurrence of low temperatures during Jan. The regional subdivision Canada on the basis of Jan. hourly temperature frequencies is carried out and regional ationships between standard deviation and the difference between the mean temperature l winter design temperatures (2½ percent basis) are determined. A table giving winter sign and comparative temperatures for four different bases of frequency at 15 Canadian alities and a map with winter design temperatures for Canada are presented. *Subject adings:* **1. Design temperatures 2. Canada.**—*I.L.D.*

6.11–232 551.524.32:517.512.2

*Craddock, J. M., **The representation of the annual temperature variation over Central l Northern Europe by a two term harmonic form.** *Great Britain. Meteorological Research mmittee, M.R.P.* 915, April 29, **1955.** 14 p. 9 figs., 6 tables, 7 refs., 7 eqs. Mimeo. Also **: The variation of the normal air temperature over the Northern Hemisphere during the ar.** *Ibid.,* 917, June 8, **1955.** 16 p. 8 figs., 9 tables, 4 refs., 3 eqs. Mimeo. **DWB**—the first paper the long-period annual variation of temperature at 42 stations in central l northern Europe is analyzed from 5-day means for first 4 harmonics. The first two resented nearly all the annual variation, except for about 10 5-day periods which had the ne anomaly at all or nearly all stations. These singularities persist when independent iods are examined; the most obvious is a positive anomaly in late May and early June.

Charts show amplitudes and phases of first two harmonics. The second paper gives an charts the amplitude, phase and date of maximum of the first two harmonics of 12 month values (1921–40) for 305 stations in the Northern Hemisphere. The best method of allowin for the different lengths of the months is discussed. *Subject Headings:* **1. Annual temperatu variations 2. Harmonic analysis 3. Temperature singularities.**—*C.E.P.B.*

6.11–233 551.524.4:621.3.029

Klinker, L., **Beitrag zum Tagesgang der Feldstärken im Ultrakurzwellenbereich.** [Dail variation of field strength in the ultrashort region.] *Zeitschrift für Meteorologie*, 9(6):178–19 June **1955.** 7 figs., 2 tables, 12 refs., 13 eqs. **MH-BH**—The frequent formation of a nocturn inversion and its dissipation by day leads to a diurnal variation of the field strength of ultr short-wave transmissions from a distance. Ranges up to double can be traced to the changin atmospheric refraction. Using measurements of vertical temperature and vapor pressu gradients near the ground this diurnal variation is calculated from the field-strength formul For mean range over a long period the temperature gradient by itself gives agreement wit observed values. At greater distances, however, there is a discrepancy increasing with distanc The cause is that the importance of refraction for ultra-short-wave transmission decreas compared with other transmission mechanisms due to meteorological causes. Especially th scattering processes at turbulence elements of the atmosphere should lead to their own for of the diurnal variation. *Subject Heading:* **1. Ultrashort wave propagation.** *Transl. of author abstract.*

6.11–234 551.524.4(42

*Shaw, J. B., **Vertical temperature gradient in the first 2,000 ft.** *Meteorological Magazin* London, 84(998):233–241, Aug. **1955.** fig., 6 tables, 2 refs. **DWB**—Observations of ter perature by captive balloon at Cardington for March 1949 to Feb. 1953 are analyzed. Table gives temperature changes 4 to 250 ft and 250–2000 ft at 12 h for different cloud amount wind speeds and seasons. Tables 2 and 3 give temperature differences between 4 ft and heights up to 2000 ft for various amounts of cloud, wind speeds and seasons, 7 h and 18 Temperatures in early morning fogs are tabulated, with a typical ascent showing isotherm layer and 100% R.H. to 500 ft, inversion to 750 ft and then a slow decrease. *Subject Heading* **1. Temperature profiles 2. Tropospheric microstructure 3. Cardington, England.**—*C.E.P.*

6.11–235 551.524.7:551.5

Carson, Robe B., **On 700–500 mb thickness and thunderstorm rainfall.** *America Meteorological Society, Bulletin*, 36(2):92, Feb. **1955.** 4 refs. **MH-BH**—Evidence from Mian rainfall is cited to show that steeper 700–500 mb lapse rates appear to inhibit rainfall in Florid The characteristic nonfrontal rainfall of Florida in contrast to the nonfrontal rainfall of Ne Mexico has a "unique thunderstorm trigger" which is the normal diurnal maximum of co vergence near 1000 ft over the interior. The behavior of the lapse rate at Miami can be use to forecast showers. *Subject Headings:* **1. Lapse rate-rainfall relationships 2. Rainfall for casting 3. Thunderstorm rainfall 4. Miami, Florida.**—*I.L.D.*

6.11–236 551.524.7:629.13(9

*Phillpot, H. R. and Reid, D. G., **Upper air temperatures for the Australian region.** *Au tralia. Meteorological Branch, Bulletin*, No. 42, **1953.** 47 p. fig., 4 tables, 28 charts. **MH BH**—The method of representing upper air temperature consists of giving mean temperatu charts for each of the constant pressures considered and more detailed mean upper air ten peratures for each of the terminal airports. From there the required upper air temperatur along an air route are readily obtainable. Tables giving for various terminal airports the mea temperature for each constant pressure value at 50 m intervals between 850 and 100 mb f Jan., April, July and Oct., the air routes in a diagram showing the isopleths of standard deviatio and provisional mean temperature charts for the specified month and constant pressure valu are presented. The method of construction of the tables and graphs is explained and th reliability of the results is considered. *Subject Headings:* **1. Upper air temperatures 2. A routes 3. Australia.**—*I.L.D.*

SOIL TEMPERATURE

6.11–237 551.525

Nidetzky, L., **Temperaturverhältnisse in hydroponischen Versuchsbeeten.** [Temperature conditions in experimental hydroponic beds.] *Wetter und Leben*, Vienna, 6(7/9):151–54, **1954.** 3 tables, ref. **MH-BH**—The temperature in three experimental layers of fine brick dust, coarse brick dust and sphagnum moss was measured thermoelectrically at depths 1, 2, 3, 4, . . . 12.5, 15, 17.5 and 20 cm. Data are given on the daily march of temperature, including maximum, minimum and amplitudes of the soil temperature at 1, 10 and 20 cm, temperatures at given times of day at different depths for specific days, etc. *Subject Headings:* **Hydroponic soils 2. Soil temperatures.**—*I.L.D.*

WATER TEMPERATURE

6.11–238 551.526.6

*Åmot, Audvin, **Measurements of sea surface temperature for meteorological purposes. Results of observations from ocean weather station M.** *Meteorologiske Annaler*, Oslo, 4(1): 1–11, **1955.** 2 figs., 6 tables. **DLC**—The observations of sea surface temperature were made from the ocean weather Station M at 66°N, 62°E by means of the condenser intake method. It is shown that the method is satisfactory and that "the variations in depth of the condenser intake do not affect the accuracy of the observations to any appreciable extent." Data are presented on the averages of temperature differences according to wind speed, frequencies of temperature differences at different wind speeds, means of temperature differences by month and the vertical distribution of density according to wind speed each month. *Subject Headings:* **1. Sea surface temperatures 2. Ocean weather stations 3. Sea surface temperature variations.**—*I.L.D.*

PRESSURE AND WIND

PRESSURE

See also: **Diurnal and interdiurnal variations of pressure surfaces** (Johnson), 6.11–98; **Pressure data** (S. Africa, Weather Bur.), 6.11–113; **Weather of 1954** (Royal Met. Soc.), 6.11–115; **Zonal baroclinity distribution** (McClain, Danielson), 6.11–190; **Geostrophic and ageostrophic wind analysis** (Smith), 6.11–193; **Ageostrophic winds** (Fultz, Frenzen), 6.11–248; **Geostrophic and observed winds** (Matsuhashi, Furukawa), 6.11–271; **Upper air wind charts** (Heastie), 6.11–272.

6.11–239 551.54(09)

Baumbach, S., **Der Luftdruck.** [Pressure.] *Wetterlotse*, No. 87:89–92, May **1955.** **DLC**—Brief account of the discovery of atmospheric pressure and history of its observation. *Subject Headings:* **1. Atmospheric pressure 2. History of meteorology.**—*C.E.P.B.*

6.11–240 551.541:551.515

§Donn, William; Rommer, Richard; Press, Frank and Ewing, Maurice, **Atmospheric oscillations and related synoptic patterns.** Columbia Univ. Lamont Geological Observatory, Contract AF 19(122)-441 and Contract N6onr 27133, Technical Report on Meteorology, No. 1, Nov. **1953.** 16 p. 13 figs., 10 refs. **DWB**—Records from sensitive microbarovariographs, installed at Palisades, N. Y., at Columbia Univ., N. Y., and on Long Island, were used to study the oscillations associated with pressure jump lines, squall lines, cold fronts, thunderstorms and low level convection and turbulence. It was found that: 1) "typical pressure jumps are resolved into positive half waves representing an abrupt surge of pressure and passage aloft of a steep gradient on a surface of discontinuity between lower cold and deeper warm air" and that negative half waves probably prevent the passage of a pressure plain or negative plateau, 2) pressure jumps may occur with or without associated squall lines, 3) "the passage of a cold front may be marked by a long, low train that may persist for several hours and may indicate the width of the frontal zone" and 4) short period oscillations usually indicate a low convection or turbulence in certain air masses and are related to

diurnal variations and cloud cover. It is also concluded that a simple convection expla the structure of single thunderstorms. *Subject Headings:* **1. Atmospheric micro-oscillati 2. Microbarographs 3. Pressure jump 4. Thunderstorm structure 5. Squall lines Cold fronts.**—*I.L.D.*

6.11–241 551.541:551.515

Freeman, John C., Jr., **Mach lines and pressure-jump lines.** *Journal of Meteorolo* 12(4):414, Aug. **1955.** 2 refs. **DWB**—Comments favorably on ABDULLAH's suggest (*see* 5.6–218, May 1955, *MAB*) that pressure jumps provide a mechanism for dissipating energy of hurricanes, and describes their relation to Mach lines. *Subject Headings:* **1. Press jump theory 2. Hurricane dynamics. I. Abdullah, A. J.**—*C.E.P.B.*

6.11–242 551.541:551.

Gossard, Earl and Munk, Walter, **'Gravity waves in the atmosphere.' Reply** by I. J. Pothecary. *Royal Meteorological Society, Quarterly Journal,* 81(349):484–487, July 19 4 figs., 6 refs. **DWB**—Discussing POTHECARY's paper (*see* 6.2–194, Feb. 1955, *MAB*), G SARD and MUNK describe an oscillation of solar radiation through thin stratus in S. Califor closely correlated with oscillations of wind speed and direction. Oscillations are of 2 typ 1) with a storm off-shore and 2) fair weather type associated with Santa Ana. *Subject He ings:* **1. Gravity waves 2. Wind fluctuations 3. California.**—*C.E.P.B.*

6.11–243 551.541:551.

Tepper, Morris, **On the generation of pressure-jump lines by the impulsive addition momentum to simple current systems.** *Journal of Meteorology,* 12(4):287–297, Aug. 19 12 figs., 6 refs., 35 eqs. **DWB**—In an initial southerly current in an atmosphere of two stratif incompressible layers an impulsive addition of momentum which initially yields a continu velocity profile is first treated as a linear problem and then extended to the non-linear ca In the latter the entire character of the disturbance is changed. The interface gravity w steepens, implying the formation of a pressure-jump line propagating normal to the direct of the original impulsive addition. A trough appears to the left of the center and is ultimat entered by a steepening wave from the right. It is suggested that this process may cause afternoon and nocturnal thunderstorms in the Plains. *Subject Heading:* **1. Pressure ju theory.**—*C.E.P.B.*

6.11–244 551.542.1:551.554

Révillon ——, [Lt. de Vaisseau], **Vent du gradient et vent réel sur mer.** [Gradi wind and real wind at sea.] *La Météorologie,* Paris, 4th Ser., No. 31:171–186, July/Se **1953.** 8 figs., 5 refs. French, English and Italian summaries p. 171. **MH-BH**—The aut summarizes and coordinates previous studies on the influence of atmospheric stability u wind velocity, the influence of latitude upon wind velocity and upon the angle formed by mean curved velocity with the isobars, and variations of wind with height above water surfa in the lower layer of the atmosphere. Modifications to be made in the table of wind veloc equivalents of code 30 (IMP) are indicated. A theoretical study of the variations of angle between the wind and isobars as a function of latitude is appended to the article. *Sub Headings:* **1. Wind deviation 2. Gradient winds.**—*I.L.D.*

6.11–245 551.543:612.275.11:551.

†Benzinger, Theodor and Hornberger, Wilhelm, **Die Druckfallkrankheit der Höhenflieg** [Pressure drop sickness of high altitude pilots.] *Deutsche Akademie der Luftfahrtforschu Munich, Schriften,* No. 34, Sitzungsperiode 1941/1942, pub. **1941.** 44 p. 3 figs., tab 30 refs. **DLC**—Pressure fall sickness is similar to mountain sickness in many respects, when changes are rapid, as in the low pressure test chambers, the symptoms of many subje resemble those experienced by divers on rapid decompressions (the bends). These experien are tabulated, described and explained on the grounds of partial pressure deficiency of oxy and the related, but secondary, deficiency of CO_2 and N_2 in the lungs or blood. Up to 8 the symptoms are not serious; above 8 km oxygen should be used, at 12 km symptoms oc even with O_2 if ascent is rapid or flight protracted. Physiology is dealt with in great de

nd literature on preventive measures reviewed. *Subject Headings:* **1. High altitude flying ffects on man 2. Air sickness 3. Pressure change effects on man.**—*M.R.*

6.11–246 551.543.1

Harris, Miles F., **Pressure-change theory and the daily barometric wave.** *Journal of Meteorology*, 12(4):394–404, Aug. **1955.** 10 figs., 20 refs., 32 eqs. Also: Haurwitz, Bernhard, **omments on "Pressure-change theory and the daily barometric wave."** *Ibid.*, p. 404 405. refs. And also: Harris, Miles F., **Reply.** p. 405–406. **DWB**—As an alternative to the reson-nce theory, the 24 hr and 12 hr pressure waves are attributed to horizontal divergence of isallo-aric winds associated with the daily temperature variation. The pressure waves follow some ours after the 2nd time derivative of surface temperature. The variation of diurnal and semi-iurnal temperature waves are computed as 4.6 sin ϕ and 1.327 cos 2.3 ϕ. The deviations of urface pressure from their daily mean values are then computed in terms of temperature eviations, latitude and longitude, and the computed annual values compared with the ob-erved values. HAURWITZ comments that the theoretical foundations are questionable and he empirical facts unconvincing, whereas the resonance theory is adequate. HARRIS replies. *ubject Heading:* **1. Diurnal pressure waves.**—*C.E.P.B.*

6.11–247 551.547.2

Gibbs, W. J., **Notes on the reduction of barometer readings.** *Australian Meteorological Magazine*, Melbourne, No. 1:5–7, July **1952.** 5 figs. **DWB**—The old problem of reduction f station pressure to a common level for synoptic purposes is discussed from the view-point f the current Australian method of reduction to sea level and the effect that inconsistencies n the formula (with respect to hypothetical or desired results) have on the variations in time nd space over rugged or high terrain. Improvements suggested are: 1) reduction to sea evel is necessary for synoptic purposes, 2) screen temperatures should not be used in formula,) horizontal density gradients in fictitious atmosphere between sea level and station level ould not be great and 4) reduction agreement should not have a diurnal variation. *Subject leading:* **1. Barometer reduction.**—*M.R.*

TURBULENCE AND GUSTINESS

See also: **Proceedings** (Midwestern Conf. on Fluid Mechanics, 3rd . . .), 6.11–3; **Use of aircraft to measure wind shear** (Pothecary), 6.11–99; **Prognostic equations for mean motions** (Thompson), 6.11–149; **Studies of cellular and linear eddies** (Bénard, Avsec), 6.11–179; **Turbulence energy spectrum** (Davies), 6.11–183; **Spectrum analysis methodology** (Estoque et al.), 6.11–185; **Meteorological turbulence** (Köhler), 6.11–188; **Horizontal diffusivity for tropospheric currents** (Lettau), 6.11–189; **Gravity waves in atmos.** (Gossard, Munk), 6.11–242.

6.11–248 551.55:551.542.1

Fultz, D. and Frenzen, P., **A note on certain interesting ageostrophic motions in a rotating emispherical shell.** *Journal of Meteorology*, 12(4):332–338, Aug. **1955.** 6 figs., 12 refs. **WB**—In a rotating hemispherical layer of liquid a 90° half depth barrier was inserted, otating at a different speed. "Westerly" currents having kinematic Rossby numbers $R \equiv \omega_r/\Omega$ bout 0.1 (ω_r = difference between bowl and obstacle rates, Ω = rotation rate of obstacle) roduced m quasigeostrophic waves which fitted HAURWITZ's formula $R = \frac{2}{(m+1)(m+2)-2}$. Easterly" currents with R about 0.1 gave a more ageostrophic cusped pattern with anti-yclonic motion between the cusps. The significance, especially for stability difference etween east and west wind currents, is discussed. *Subject Heading:* **1. Ageostrophic winds.**—*E.P.B.*

6.11–249 551.551:533.16

Blackadar, Alfred K., **Notes on the transformation of mechanical energy from and to ddying motion.** *Journal of Meteorology*, 12(4):412–413, Aug. **1955.** 4 refs. Also: Lettau, einz, **Reply.** *Ibid.*, p. 413–414. **DWB**—BLACKADAR criticizes LETTAU's statement (*see* 5.10–

106, Oct. 1954, *MAB*) that the expression for transformation of energy of mean motion to eddy energy has no physical basis. LETTAU replies that the large positive values of the Reynolds function near the ground indicate a maximum of viscous dissipation, and refers to the aerodynamic model of isotropic turbulence. *Subject Heading:* **1. Eddy viscosity.**—*C.E.P.B.*

6.11–250 551.551:523.74

Frenkiel, Francois N. and Schwarzschild, M. (*Appl. Physics Lab., Johns Hopkins Univ.*) **Additional data for turbulence spectrum of solar photosphere at long wave lengths.** *Astrophysical Journal*, Chicago, 121(1):216–223, Jan. **1955.** 2 figs., 2 tables, 2 refs., 7 eqs. **DWB**—A plate showing the granulation with exceptional definition was selected from the regular Mount Wilson solar program. On this plate 8000 intensity measurements were made. The measurements were analyzed in terms of a turbulence spectrum of photospheric intensities. The spectrum, when corrected for the finite resolution of the photograph, is found to be fairly constant in the wave-length band from 2000 to 30,000 km. This result of the turbulence spectrum of photospheric intensities is similar to the earlier indications found for the turbulence spectrum of velocities, in showing that the spectrum contains much energy in the wave-length band around 15,000 km, but disagrees with them in not showing in the corrected spectrum a large decrease from 15,000 to 4000 km. *Subject Headings:* **1. Solar photosphere 2. Turbulence spectrum.**—*Authors' abstract.*

6.11–251 551.551:629.13

*Gumbel, Emil J. (*Columbia Univ.*) and Carlson, Phillip G. (*Curtiss-Wright Corp.*), **Extreme values in aeronautics.** *Journal of the Aeronautical Sciences*, 21(6):389–398, June **1954.** 12 tables, graphs, 14 refs., eqs. **DLC**—It is known that large and small gust accelerations encountered in flights at essentially constant airspeed are distributed according to exponential laws. Hence, extreme accelerations, gust velocities and maximum airspeeds observed under certain conditions may be analyzed by the asymptotic theory of extreme values. To this end a short résumé of this theory, graphical procedures for its use and for the control curves are given in the first paragraph. In paragraphs 2 and 3 it is shown that extreme winds, maximum airspeeds, and extreme gust accelerations follow this distribution. Finally, the theory is applied to largest, smallest and extreme accelerations. *Subject Headings:* **1. Gust velocities 2. Aeronautical meteorology 3. Exponential laws.**—*Authors' abstract.*

6.11–252 551.551:551.554

Hay, J. S., **Some observations of air flow over the sea.** *Royal Meteorological Society Quarterly Journal*, 81(349):307–319, July **1955.** 6 figs., 4 tables, 7 refs., 8 eqs. **DWB**—Anemometer observations were made at 0.5, 1, 2, 4 and 8 m above the edge of a platform floating in 25 m of water 800 m east of British coast, with SW–NW winds. With zero gradient and small lapse log formulas are fitted, the roughness parameter varying from 0.02 cm with wind of 5 m/s to 0.25 at 9 m/s. With inversion the log formula did not fit above 4 m, but no better alternative was found. Other workers' results are compared. Some measurements with bidirectional vanes at 1 and 2 m showed little change in vertical gustiness (0.20) but a drop in lateral gustiness from 0.486 at 1 m to 0.440 at 2 m. *Subject Heading:* **1. Air flow over the sea.**—*C.E.P.B.*

6.11–253 551.551

Takeda, Kyoichi, (*Govt. Forest Experiment Station*), **On the atmospheric turbulence, Pt. 4, On the mixing-length near the earth's surface.** *Meteorological Society of Japan, Journal*, 30(4):141–146, Apr. **1952.** 2 figs., 7 refs., 23 eqs. **MH-BH**—Discusses effect of stability on mixing length (l) and proposes the semiempirical formula $l=0.4\ hz^{\beta}$; z—height; $\beta \gtrless l$—unstable, adiabatic, stable conditions; parameter h depends also on stability. Relation to Richardson number shown. Correction factor to the evaporation formula of THORNTHWAITE and HOLZMAN shown in relation to the rate of stability. *Subject Headings:* **1. Mixing length 2. Thermal instability 3. Turbulent transfer of moisture.**—*A.A.*

6.11–254 551.551:533.17

Tchen, C. M., **On the spectrum of energy in turbulent shear flow.** *U. S. National Bureau of Standards, Journal of Research*, 50(1):51–62, Jan. **1953.** fig., 11 refs., eqs. **DWB**—A

rbulent flow with a given spatial pattern of mean motion invariant with time is treated. o solid boundary is considered. By means of the Fourier analysis of the Navier-Stokes uation, it is possible to obtain an equation of energy balance in spectral terms. This in- lves the following functions: Viscous dissipation, transfer, production, convection, and ffusion. The first two functions are common to the isotropic and homogeneous turbulence thout mean motion. Assuming that eddies controlled by inhomogeneity are much larger an those controlled by anisotropy, stationary spectral laws are obtained for small eddies the viscous and nonviscous ranges. The agreement between theory and experiment is own. *Subject Headings:* **1. Turbulent flow 2. Turbulence theory.**—*Author's abstract.*

WIND VARIATIONS AND VERTICAL DISTRIBUTION

See also: **Wind velocity measurem.** (Schotland), 6.11–93; **Vector computation of wind** (Vilkner), 6.11–101; **Dynamic linkages** (Wexler), 6.11–151; **Turbulence and thermal equilibrium in atmos.** (Ito et al.), 6.11–181; **Gradient wind and real wind at sea** (Revillion), 6.11–244; **Air flow over sea** (Hay), 6.11–252; **Rain and fog frequency** (Troeger), 6.11–298; **Glacier winds** (Negri), 6.11–337.

6.11–255 551.553(521.43)

Kikuchi, T., **A note on surface winds in Ishikawa Prefecture.** *Journal of Meteorological esearch*, Tokyo, 6(1/3):65–66, March **1954.** 2 figs. In Japanese; English summary p. 65 **H-BH**—In the present paper the surface data is taken from 3 stations—Wajima, Kanazawa d Takada. These are 100 km apart and were selected because their relative position is ctangular. Comparing the calculated value to the observed one at Kanazawa, it follows at: 1) the deviation of these two is about 40°, 2) the effect of land and sea breeze is consider- le, 3) 90% of the wind direction at night is easterly, and 4) the most frequent wind direction daytime changes clockwise by season. *Subject Headings:* **1. Surface winds 2. Land and a breezes 3. Japan.**—*Author's abstract.*

6.11–256 551.553.11

Pearce, R. P., **The calculation of a sea-breeze circulation in terms of the differential ating across the coastline.** *Royal Meteorological Society, Quarterly Journal*, 81(349):351–1, July **1955.** 20 figs., 7 refs., 77 eqs. **DWB**—A method is derived for calculating the locity, temperature and pressure distributions of the sea-breeze produced when an initially thermal and static atmosphere is heated differentially across a long straight coastline. eat is assumed to be distributed vertically from the land surface by convection currents; ernal friction is included but surface drag is taken as zero. The motion is separated into o parts, a rotational non-divergent component near the coast and a mainly irrotational ge-scale tidal motion transferring mass from land to sea. The former is considered first d a numerical method devised to enable the non-linear equations to be solved. The solutions e given as a set of diagrams each showing values of velocity, temperature and pressure culated over a network of points, and each referring to a particular time in the development the motion. In Sec. 5 the tidal motion is considered and an analytical solution obtained ce the equations can be linearized. The rotational solution represents the spread inland a tongue of cold air; well inland the wind rises some hours after heating has started, and is companied by a fall in temperature. An upper return current occurs in all the diagrams well as subsidence over the sea and upper cooling inland. The vertical temperature profiles ow a sharpening of the discontinuity in lapse rate at the top of the convection layer produced the vertical velocity component. Conditions for convective instability are found to be oduced dynamically in a shallow layer of the upper return current. Comments are made the formation of "heat lows" and "cold highs" over continents. *Subject Heading:* **1. Sea eeze circulation.**—*Author's abstract.*

6.11–257 551.554:551.43

Kibel', I. A., **Prostranstvennaia zadacha obtekania nerovnosteĭ poverkhnosti zemli zdushnym potokom.** [The spatial problem of the flow of air currents around obstacles on e surface of the earth.] *Akademiia Nauk SSSR, Doklady*, 100(2):247–250, Jan. 11, **1955.**

ref., 26 eqs. **DLC**—This theoretical analysis of the flow of air currents around obstacles on the surface of the earth deals with an air current of specified velocity which flows horizontally at a distance above the obstacle. The movement is assumed to take place within a layer of a thickness of several kilometers at infinite distance from the windward side and above the layer the atmosphere is at rest. *Subject Headings:* **1. Air flow characteristics 2. Air flow around obstacles 3. Mountain effects.**—*I.L.D.*

SPECIAL WINDS

6.11–258 551.555

Meiklejohn, Jane, **The local wind at Milfield, Northumberland.** *Royal Meteorological Society, Quarterly Journal*, 81(349):468–474, July **1955.** fig., 4 tables, 5 refs. **DWB**—Milfield airfield is at the mouth of a small valley running WSW into the hills. Gales and strong winds from WSW, W and SW are abnormally frequent (97 hrs force 8–11 in 3 months) compared with neighboring stations. Geostrophic wind mainly 240–270°. The wind is less than 100 ft deep and decreases up-valley. It is not katabatic but appears to be due in some way to the local topography. *Subject Headings:* **1. Local winds 2. Topographic effects 3. Milfield, England.**—*C.E.P.B.*

6.11–259 551.555.9

†Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovania v Prikaspiĭskoĭ Nizmennosti.** [Microclimatic and climatic investigations in the Caspian Plain.] Moscow, **1953.** 167 p. figs., tables, refs. Price: 9 rub. 50 k. **DLC**—A preface by B. L. Dzerzeevskiĭ appears in this collection of reports presented at a conference called by the Institute of Geography and the Complex Scientific Expeditions of the Academy of Sciences, Aug. 25–28, 1951, devoted to climatological and geophysical investigations in the Caspian Region. The papers deal with the theory of the origin of the dry winds (sukhoveĭ), with the possibilities of reducing their harmful effect, with methods and instruments of observation, etc. The significance of the reports is evidenced by the fact that there is yet no single opinion on the origin of the dry winds or their manifestation and development. No generally adopted definition and no coordinated meteorological criteria for the phenomenon have been developed. Several papers have been abstracted separately (*see* 6.11–262, 6.11–278, 6.11–279, 6.11–333 to 6.11–335, Nov. 1955, *MAB*). *Subject Headings:* **1. Climatic studies 2. Dry winds 3. Sukhoveĭ 4. Caspian Plain, U.S.S.R.**—*A.M.P.*

6.11–260 551.555.9:551.558.21(523)

Akiyama, Toshio, **On the occurrence of the local severe wind "Yamaji," Pt. 1.** *Journal of Meteorological Research*, Tokyo, 6(8):375–380, Nov. **1954.** 8 figs., table, 16 refs. In Japanese; English summary p. 375. **DWB**—The author discusses the mechanism of the occurrence of the local severe wind "Yamaji," using the observational data of 1952, especially those of May 26–27, 1952, and found that the phenomena accompanying this severe wind are explained by the so-called lee wave (after R. S. Scorer). *Subject Headings:* **1. Lee waves 2. Local winds 3. Japan.**—*Author's abstract.*

6.11–261 551.555.9:551.556.1(523)

Hakoda, H. and Akaiyama, Toshio, **Damage caused by a local wind "Yamaji."** *Journal of Meteorological Research*, Tokyo, 6(8):388–393, Nov. **1954.** 6 figs. In Japanese; English summary p. 388. **DWB**—An example of damage caused by a local strong wind called "Yamaji" in the Uma district, Ehime Prefecture, is examined for the case of the Typhoon "Ruth," Oct. 14–15, 1951. The areas of damage to tobacco plants and to houses are shown in Figs. 2 and 4, respectively. Fig. 6 shows that sugar cane was flattened in the direction of the strong wind. *Subject Headings:* **1. Wind damage 2. Yamaji wind 3. Typhoon "Ruth" (1951) 4. Japan.**—*From authors' abstract.*

6.11–262 551.555.9

†Vitvitskiĭ, G. N., **O prirode sukhoveev.** [The nature of dry winds.] (In: Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie**

sledovaniia v Prikaspiĭskoĭ Nizmennosti, Moscow, **1953.** p. 5–17. refs. p. 16–17.) **DLC**—ie phenomenon of "sukhoveĭ" (dry winds prevailing in the pre-Caspian lowlands) is examined om three viewpoints: 1) physiological, and effect on vegetation; 2) meteorological definition th an analysis of interrelated weather characteristics and their numerical expressions most liably reflecting the meteorological properties of winds and 3) origin and cause (intrusion Arctic air and its transformation over the continent). *Subject Headings:* **1. Sukhoveĭ 2. Dry nds 3. Caspian Plain, U.S.S.R.**—*A.M.P.*

WIND EFFECTS

See also: **Height of wind in travelling rectangular wind field** (Walden), 6.11–62; **Swell produced by newly generated storm area** (Walden), 6.11–63; **Swell generated by wind field** (Walden), 6.11–64; **Effect of earth's rotation on water level** (Thiel), 6.11–65; **Damage by local winds** (Hakoda, Akiyama), 6.11–261.

6.11–263 551.556:551.481

Darbyshire, J. and Darbyshire, Mollie, **Determination of wind stress on the surface of ough Neagh by measurement of tilt.** *Royal Meteorological Society, Quarterly Journal,* (349):333–339, July **1955.** 5 figs., 3 tables, 7 refs. **DWB**—Water level records at 4 points Lough Neagh were averaged over 3 hours and differences correlated with components of uares of wind velocity at 12 m at Aldergrove. Correlations ranged from 0.74 to 0.88 and re not improved by using cubes of velocity. The stress coefficient was 0.82 to 1.60×10^{-3} r stable, 1.26–2.23 for neutral and 1.70–3.20 for unstable conditions, increasing with length path over water. Wave heights for a given wind speed appeared to be greater when the was colder than the water but evidence was not conclusive. *Subject Headings:* **1. Wind ress 2. Wind effects on water surfaces 3. Lough Neagh, Ireland.**—*C.E.P.B.*

6.11–264 551.556:551.465

Gelci, R. and Gazale, H., **Une théorie énergétique de la houle appliquée au Maroc.** [An ergy theory of sea swell used in Morocco.] *Rabat, Morocco. Institut Scientifique Chérifien. rvice de Physique du Globe et de Météorologie, Recueil des Publications,* No. 4, **1953.** Reprint om *Société des Sciences Naturelles et Physiques du Maroc, Comptes Rendus* No. 4:64–66, **53. DWB**—Principles involving calculation of the flow of energy produced by a sea swell th a symmetrical spectrum about a period T with all the energy concentrated about T e developed. Consideration of wind energy and wave formation are utilized in deriving method of forecasting energy which is illustrated in forecasting sea swell in Morocco. Re-lts of such forecasts are given. *Subject Headings:* **1. Ocean wave energy 2. Ocean swell Ocean wave forecasting 4. Morocco.**—*I.L.D.*

6.11–265 551.556

Hela, Ilmo (*Miami Univ. Marine Lab.*), **Variations in the Atlantic wind stress vorticity.** *lletin of Marine Science of the Gulf and Caribbean,* 2(1):313–323, Nov. **1952.** 8 figs., table, refs. Abstracted from reprint. Also issued as: *Miami, Florida. Univ. Marine Laboratory, ntribution,* No. 72. **DWB**—The regional distribution of the vorticity of the wind stress r different months has been computed for the Atlantic Ocean using the data of the Scripps stitution of Oceanography, Oceanographic Report, No. 21, 1950. The variations in the tensity of the Subtropical Gyre and in the locations of the zero-lines between negative and sitive vorticity areas have been compared with the annual cycle of the charted surface rrent in the Straits of Florida. It appears probable that the annual variation in the intensity the negative vorticity of the Subtropical Gyre, together with the S-N movement of the sitive vorticity area, south of the former, are responsible for the annual variation in the ength of the current. The regional distribution of the vorticity of wind stress in April, ay, July, Sept., and Oct. is shown on maps. *Subject Headings:* **1. Wind stress 2. Atlantic ean. I. Contract Nonr 849(01).**—*Author's abstract.*

6.11–266 551.556:551.313(261.2)

Lucht, Fritz, **Die Sandwanderung im unteren Tidegebiet der Elbe.** [Sand transport the outer estuary of the Elbe.] *Deutsche Hydrographische Zeitschrift,* 6(4/6):186–207,

1953. 16 figs., 4 tables, 19 refs., 14 eqs. German, English and French summaries p. 18 **DWB**—Constitution and movements of sand banks are described. Good agreement is fou between erosion-sedimentation and difference between W and E wind components at Elbe Lightship. There is also some agreement with flow of Elbe River. Mechanism of sa transport in a tidal river is discussed. *Subject Headings:* **1. Wind effects 2. Estuarine sa banks 3. Elbe River, Germany.**—*C.E.P.B.*

6.11–267 551.556:551.

Munk, W. H., **Wind stress on water: an hypothesis.** *Royal Meteorological Societ Quarterly Journal,* 81(349):320–332, July **1955.** 4 figs., table, 17 refs., 24 eqs. **DWB**—Th form drag of wind on an irregular surface is found to equal the product of U^2 (U is anemomet wind-speed) and a function of the two-dimensional spectrum of this surface. For a soli surface this function is, of course, independent of U and the form drag is proportional to U as observed over land. Over water, NEUMANN's frequency spectrum and the glitter measure ments by COX and MUNK make this function proportional to U, and hence the form dra proportional to U^3. The computed form drag is not far out of line with measurements b VAN DORN and others. The dependence of form drag on the "beam-width" and frequenc spectrum of the surface roughness is discussed. The essential roughness statistic comes clos to being the mean-square *slope* of the surface, rather than being related to wave height o some other roughness *length,* as usually assumed. The slope statistics are governed by th high-frequency part of the wave spectrum, and this feature accounts for the pronounce reduction of form drag by surface "slicks," and the relatively small effect of a limited fetch The total drag, $c_1U^2+c_2U^3$ (skin friction+form drag), must be larger at very high wind than if it followed a U^2 law, as usually assumed. *Subject Heading:* **1. Wind stress.**—*Author' abstract.*

6.11–268 551.556:551.311.

Petersson, Gunnar, **Om skador på åkerjord genom vinderosion i Sverige.** [Damage t arable land caused by wind erosion in Sweden.] *Grundförbättring,* Uppsala, 3(1):32–47 **1949/50.** illus., ref. **DLC**—The extent of the areas subject to wind erosion in Sweden, th nature of wind erosion, damage to vegetation, causes of wind erosion and means for com batting it are discussed. Photographs illustrate various aspects of the problem. *Subject Headings:* **1. Wind erosion 2. Sweden.**—*I.L.D.*

6.11–269 551.556:551.465

Shtokman, V. B., **Sootnosheniia mezhdu polem vetra, polem polnykh potokov i srednim polem mass v neodnorodnom okeane.** [Relationship between the wind field, the field o currents and the mean field of masses in a heterogeneous ocean.] *Akademiia Nauk SSSR, Doklady, Novaia Seriia,* 59(4):675–678, Feb. 1, **1948.** 3 refs., 21 eqs. **DLC**—EKMAN's theory of water movements evoked by wind does not consider vertical frictional influences. In this paper the theoretical influence of bottom relief, where vertical velocity gradients are as important as they are near the surface of the sea, is formulated, allowing corrections to be applied to calculations using EKMAN's theory. *Subject Headings:* **1. Wind driven currents 2. Bottom topography influence 3. Ekman spiral.**—*M.R.*

UPPER AIR WINDS

See also: **Wind derivation from vertical photos** (Hurst), 6.11–97; **Aircraft use to measure wind shear** (Pothecary), 6.11–99; **Winds-aloft observations** (Reed), 6.11–100; **Curvature corrections for radiowind reports** (Kessler), 6.11–102; **Winds aloft forecasting** (Ellison, Walshaw), 6.11–154; **Geostrophic and ageostrophic wind analysis** (Smith), 6.11–193; **Upper east wind of Copernicus** (Stenz), 6.11–198; **Jet stream structure** (Lee), 6.11–201; **Jet stream** (Van der Ham), 6.11–203; **Scintillation intensities** (Gifford), 6.11–351.

6.11–270 551.557(261)

*Gillman, C. J. and Rohan, P. K., **Analysis of wind components at the 700 and 500 mb levels along the great circle track between Shannon Airport, Ireland and Gander Airport,**

ewfoundland. *Eire. Meteorological Service, Technical Note,* No. 17, May **1954.** 8 p. tables, 8 figs., 8 refs. **DWB**—Wind components from Shannon, Ireland to Gander, Newundland for 700 and 500 mb levels, based on 0400 and 1600 GMT data for 1947 and 1948, nd 0300 and 1500 data for 1949–1953 were computed and frequency distribution of daily alues shown by histograms and tables. Mean monthly wind components and standard eviation of same are shown for each month of each year. Correlation coefficients and linear gression equations between 700 and 500 mb components are also shown for each month of e year, and root mean square 12 hr and 24 hr change of the 700 mb component. Feb. and lay show strong bi-modal distributions in wind components on histograms. This is believed be due to high incidence of blocking or low index regimes. *Subject Headings:* **1. Upper air ind frequencies 2. Statistical studies of winds aloft 3. Aeronautical meteorology 4. Shannn-Gander air route.**—*M.R.*

6.11–271 551.557:551.542.1

Matsuhashi, S. and Furukawa, K., **Comparison of geostrophic and observed winds. ateno, Japan.** *Aerological Observatory, Journal,* 5(4):337–343, March **1954.** 3 figs., table, refs. In Japanese; English summary p. 337. **MH-BH**—The comparison between georophic and observed winds was made with regard to west component on 700, 500, 300 and 00 mb surfaces. Though the authors cannot expect sufficient accuracy in the result, this ethod would give a general aspect of geostrophic approximation. It is shown that the rrected mean values of geostrophic winds agree with those of observed winds within the nits of 1–2 m/sec. In the last section the authors indicated the error of geostrophic wind otained from the **Mean charts of upper air over Japan.** *Subject Headings:* **1. Geostrophic inds 2. Geostrophic approximation 3. Wind observations 4. Japan.**—*Authors' abstract.*

6.11–272 551.557.2:551.547

Heastie, H., **Average height of the standard isobaric surfaces over the area from the orth Pole to 55°N. in January.** *Great Britain. Meteorological Research Committee, M.R.P.* 8, May 31, **1955.** 6 p. 11 charts, ref. Mimeo. **DWB**—A revision of **Upper winds over e world** (*see* 10–117, Oct. 1950, *MAB*) was begun by constructing circumpolar charts for andard pressure levels for Jan. 1949–53. The sources of data are given and method of nstruction described. Charts give contour heights (gp.d.m.) for 700, 500, 300, 200, 150 nd 100 mb and intervening thicknesses. *Subject Headings:* **1. Relative topography 2. Upper r wind charts 3. Arctic.**—*C.E.P.B.*

6.11–273 551.557.3:551.590.25

Greenhow, J. S. and Neufeld, E. L., **Diurnal and seasonal wind variations in the upper mosphere.** *Philosophical Magazine,* London, Ser. 7, 46(376):549–562, May **1955.** 6 figs., tables, 8 refs. **DWB**—Winds at 80–100 km were measured at Jodrell Bank by radio reflecons from meteor trails. The great turbulence was smoothed out by averaging over 100 bservations an hour over a wide region. N–S and E–W wind components on a number of ays in 1953–54 are analyzed. The main variation is semidiurnal, of amplitude up to 40 m/s, wards N at 6 h and 18 h (earlier in autumn) and rotating clockwise. The diurnal comonent is small (about 5 m/s) and variable. The prevailing winds have a semiannual variation 20 m/s, towards E in summer and winter, W in spring and autumn. *Subject Headings:* **Meteoric drift measurements 2. Upper air wind variations 3. Jodrell Bank, England.**—*E.P.B.*

VERTICAL CURRENTS

See also: **Occurrence of local winds** (Akiyama), **6.11–260.**

6.11–274 551.558.1

Smith, R. C., **Theory of air flow over a heated land mass.** *Royal Meteorological Society, uarterly Journal,* 81(349):382–395, July **1955.** 10 figs., 7 refs., 30 eqs. **DWB**—The velocity eld due to diurnal variation in the heating of a horizontal strip 200 km wide is expressed by e equations of motion, continuity and heat. The results of calculations are shown graphally. The results are reasonable and show interesting features. "One of these is the evidence

of subsidence, with its associated inflow of air, over the land while the heating is still taking place; and another is the movement of the wave-like perturbations of velocity outward from the centre of the land-mass." *Subject Headings:* **1. Air flow over heated land 2. Sea breeze circulation.**—*C.E.P.B.*

6.11–275 551.558.21:551.4

Förchtgott, J.. **The measurement of airflow deformation behind mountains [and discussion].** *Royal Meteorological Society, Quarterly Journal*, 81(349):488–493, July **1955. DWB**—A discussion on "Airflow over mountains" took place at the R. Meteor. Soc. on Jan. 19, 1955. This report includes a summary of the paper by J. Förchtgott on methods of observing airflow waves by cloud, variometer and temperature, and summaries of other contributions describing theoretical work and flying or gliding experiences. J. S. Sawyer showed a rainfall pattern over Scotland associated with flow over mountains. R. K. Pilsbury gave details of 87 reports of standing waves by pilots over the United Kingdom. For R. S. Scorer's contribution (*Ibid.*, p. 340–350; *see* 6.11–276). *Subject Heading:* **1. Air flow over mountains.**—*C.E.P.B.*

6.11–276 551.558.21:551.4

Scorer, Robert S., **Theory of airflow over mountains, Pt. 4, Separation of flow from the surface.** *Royal Meteorological Society, Quarterly Journal*, 81(349):340–350, July **1955.** 7 figs., 20 refs. **DWB**—Types of separation of flow from the surface are: a) the air mass type when the upper layer flows over an inversion (not discussed); b) the 2-dimensional aerodynamic type involving stationary eddies with reversed flow along the ground—"bolsters" on steep windward slopes, lee eddies, rotors and lee waves; separation also occurs readily at a sharp salient edge; c) in the 3-dimensional type involving flow round as well as over a hill the air blows through the eddy. Conditions suitable for and inhibiting separation are discussed, including the sequence when a lee eddy is periodically released, and violent short-lived disturbances due to heavy rain. Many examples are quoted. *Subject Heading:* **1. Air flow over mountains.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY AND EVAPORATION

See also: **Glacial ablation** (Schieldrup Paulsen), 6.11–215.

6.11–277 551.571:551.573

*Dammann, Walter, **Zur Klimatologie des Sättigungsdefizits.** [On the climatology of the saturation deficit.] *Annalen der Meteorologie*, 6(9/10):271–282, **1953/1954.** 8 figs., 3 tables, 4 refs. **MH-BH**—Saturation deficit is a measure of drying power. Curves and frequencies of diurnal variation in winter and summer and annual variation are given for Göttingen, Nordeney and Braunlage, also diurnal variation in anticyclone (up to 24 mm inland) and passage of front (shower). Maps show mean and number of days above 7.5 mm for W. Germany, 14 h July–Sept. 1949. There has been a general large increase of saturation deficit, parallel with increase of temperature, at Bremen since 1890. *Subject Headings:* **1. Saturation deficit 2. West Germany.**—*C.E.P.B.*

6.11–278 551.573

Ioganson, V. E., **Opyt izucheniia ispariaemosti v Prikaspii.** [A study of evaporation in the Caspian region.] (In: Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti,** Moscow, **1953.** p. 65–78, 10 figs., 4 tables, 4 refs.) **DLC**—Discusses the method and results of a study of evaporation made in 1951 with a perfected soil evaporator on the open steppe and in a depression near a pond in the vicinity of the station at Dzhanybek, West Kazakhstan. The simultaneous observations of evaporation at both points show considerable variations of daily evaporation and of mean daily values of meteorological elements influencing evaporation. *Subject Headings:* **1. Evaporation measurement 2. Evaporimeters 3. Caspian Plain, U.S.S.R.**—*A.M.P.*

6.11–279 551.573

Rozhanskaia, O. D., **Raschet summarnogo isparenиia s oroshaemykh poleĭ, zaniatykh zernovymi kul'turami.** [Computation of total evaporation in irrigated fields cultivated with grain crops.] (In: Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiiskoi Nizmennosti,** Moscow, **1953.** p. 154–161. 2 figs., table, refs., 3 eqs.) **DLC**—Enumerates and briefly describes five methods of computing total evaporation. Author then presents preliminary data on total evaporation obtained by the methods of turbulent diffusion and heat balance. The material for the computation was obtained in 1951 at the Engels experiment station in Saratov province. *Subject Headings:* **1. Evaporation calculations 2. Irrigated fields 3. Saratov Region, U.S.S.R.**—*A.M.P.*

6.11–280 551.573

†Tryselius, Olof, **Om avdunstningen i södra Sverige.** [Evaporation in Southern Sweden.] *Stockholm.* (*K.*) *Lantbruksakedemiens, Tidskrift,* 85(5):468–476, **1946.** 5 tables, bibliog. p. 476. English summary p. 475–476. **DLC**—This hydrological approach to the subject was carried out to compare the results with those of other workers, in particular STÅLFELT's. Tabulated data shows that evaporation in southern Sweden hardly exceeds 400 mm annually, including ground surface interception and transpiration. STÅLFELT's values do not seem to be valid for larger areas, nor even for local areas, if the high evaporation to be assumed in wintertime is considered. *Subject Headings:* **1. Evaporation 2. Southern Sweden.**—*W.N.*

CONDENSATION

See also: **Production of droplets** (Druett, May), **6.11–133.**

6.11–281 551.574

Imai, Ichiro, **Studies on ice accretion.** *Researches on Snow and Ice,* Tokyo, No. 1:35–44, Nov. **1953.** 7 figs., 6 plates, 10 refs., 10 eqs. In Japanese. **DWB**—The author summarizes his studies on ice accretion as reported in articles previously abstracted (*see* 2.3–119, March 1951, *MAB*). He discusses the classification and physics of ice formation and icing speed according to the weather conditions. *Subject Headings:* **1. Ice accretion 2. Ice formation.**—*H. Arakawa.*

6.11–282 551.574.1:536.42

Bigg, E. K., **Ice-crystal counts and the freezing of water drops.** *Royal Meteorological Society, Quarterly Journal,* 81(349):478–479, July **1955.** fig., 2 refs., 2 eqs. **DWB**—The numbers of ice crystals per liter in a cold box, observed by E. J. SMITH and K. J. HEFFERNAN at different temperatures, are compared with calculated values. The calculated curve lies at the lower limit of the observed values (which is probably correct) at nearly the same slope. *Subject Heading:* **1. Ice crystal formation.**—*C.E.P.B.*

6.11–283 551.574.42:551.43

Limbert, D. W. S., **The formation of ice in mountain regions, with emphasis on British winter hill conditions.** *Mountaincraft,* 27:14–18, April/June **1955.** 5 figs., 9 refs. **GB-MO**—Ice layers are caused by thawing and refreezing of snow by changes of temperature (black ice) or by direct deposition from supercooled water (glaze), mainly in thick clouds during strong winds. Exposure of British hills to moist winds from the Atlantic is the main cause. Weather leading to fatal accidents of Easter 1951 is described. *Subject Headings:* **1. Icing of roads 2. Great Britain.**—*C.E.P.B.*

6.11–284 551.574.42:621.315

Oguchi, Hachiro, **Icing on electric wire.** *Researches on Snow and Ice,* Tokyo, No. 1:45–49, Nov. **1953.** 13 figs., table, 5 refs. In Japanese. **DWB**—The author discusses the relation of icing on electric wire versus the weight, and describes an experiment to prevent icing on electric wires by heating. As might be expected, the critical heat quantity increases with the wind speed, but decreases with the temperature; relationship is shown in a graph (Fig. 13). *Subject Headings:* **1. Icing of wires 2. Icing prevention.**—*H. Arakawa.*

6.11–285 551.574.42

Smith, R. Michael, **Glazed frost.** *Meteorological Magazine*, London, 84(998):259, August 1955. **DWB**—Descriptions of four glazed frosts in or near Burnley in 1953–55. *Subject Headings:* **1. Glaze 2. Burnley, England.**—*C.E.P.B.*

FOG

See also: **Radiation fog** (Stewart), 6.11–160; **Rain and fog frequency** (Troeger), 6.11–298.

6.11–286 551.575.1:551.508.76

Robinson, Elmer, **An investigation of the fog phenomena in the Alaskan area.** Stanford Research Institute, Contract AF 19(122)-634, SRI Project No. CU-473, Final Report, Feb. 1, 1953–Feb. 28, 1953, Report No. 16, May 27, 1954. 65 p. 28 figs., 5 tables, biblio. p. 65. **DWB**—The results of the 1952–53 winter field program, at Eielson Air Force Base, Alaska, dealing with the physical properties of ice fog, the associated microclimatic conditions and the instrumentation developed for conducting these studies are reviewed. The field observations include photomicrographic examinations of ice fog particles of which "droxtals" were the principal constituent, a record of the concentration of smoke and nonvolatile material, ice fog humidity studies on filtered and unfiltered air, temperature profile studies, atmospheric potential measurements, electronic dew-point indicator observations, field experiments on the use of angular dependence of scattered light in fogs, and hourly micrometeorological observations. The instrumentation described with the aid of diagrams and photographs, consists of a micrometeorological tower, a wiresonde temperature and wind speed recorder, apparatus for field humidity determinations, light scattering apparatus, the aerosol camera and its associated light source, transmissometer, portable air pump, and reference temperature bath. The characteristics of low temperature aerosols are discussed in the appendix. *Subject Headings:* **1. Ice fog 2. Ice fog formation 3. Fog instrumentation 4. Low temperature fog formation 5. Alaska.**—*I.L.D.*

CLOUDS

See also: **Cumulus influence** (Nakayama), 6.11–211; **Sky brightness** (Petherbridge), 6.11–217.

6.11–287 551.576:551.590.21

Zamorskiĭ, A. D., **Solnechnye otbleski na oblakakh.** [Solar reflections on clouds.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 86(1):104–105, Jan./Feb. 1954. 2 figs. **DLC**—This phenomenon observed at the end of 1947 in the northern outskirts of Leningrad consisted of a bright, reddish spot upon a dark layer of low altocumulus clouds. The possible explanation of this solar reflection assumes that it is caused by the reflection of the sun's rays from the surface of a body of water. *Subject Heading:* **1. Solar reflections on clouds.**—*I.L.D.*

6.11–288 551.576.1:629.135.2

Cash, Homer F. and Hobbs, T. W. K. (*U. S. A. F., G. R. D., Cambridge, Mass.*), **A well-developed contrail formation.** *American Meteorological Society, Bulletin*, 36(1):34–35, Jan. 1955. 2 figs., **MH-BH**—A diagram and description of contrails produced by a B–47 flying at an estimated altitude of 37,000 ft. "At first the contrails came back in a straight line but then gradually converged" forming smoke rings. Observations were made at a distance of about 300 mi from the core of a jet stream. *Subject Heading:* **1. Condensation trails.**—*I.L.D.*

6.11–289 551.576.1:629.135.2

Clements, J. A., **Distortion of condensation trails.** *Meteorological Magazine*, London, 84(997):223–224, July 1955. fig. **DWB**—Curious saw-tooth distortions of condensation trails over Cambridgeshire on March 10, 1955, are illustrated. *Subject Headings:* **1. Condensation trails 2. Cambridgeshire, England.**—*C.E.P.B.*

6.11–290 551.576.11

Descamps, A., **L'aérologie des nuages à développement vertical.** [Aerology of clouds with vertical development.] *Belgium. Institut Royal Météorologique, Contributions*, No. 15, **1954.** 2 figs. **DWB.** Reprinted from *Revue des Questions Scientifiques*, Ser. 5, v. 15:336–351, July 20, **1954.**—Theoretical treatment reviewing conditions occurring in a mass of air which would favor development of convective clouds (Cu and CuNb). The author takes up: 1) temperature and pressure variations with height, 2) stability of a dry air mass, 3) effect of humidity in an air mass, 4) virtual temperature, 5) saturated adiabatic processes, 6) saturated adiabatic lapse rate, 7) vertical displacement of particles, 8) stability and instability of an air mass, 9) conditional and convectional instability of air mass and 10) emagrams. Applications are reserved for a later paper. *Subject Headings:* **1. Cloud aerology 2. Convective cloud thermodynamics.**—*M.R.*

6.11–291 551.576.11

James, D. G., **The nocturnal dissipation of strato-cumulus cloud.** *Great Britain. Meteorological Research Committee, M.R.P.* 913, April 12, **1955.** 6 p. fig., 4 tables, ref. Mimeo. **DWB**—Typical cases of dissipating and nondissipating StCu were examined statistically for advection and vertical motion, radiation from cloud top, turbulent mixing with air above or below, and cloud thickness. A parameter $\xi = x - 9.15y - 0.77z$ is devised, where x = max depression of dew point °F below temperature up to 50 mb above cloud top, y = average hydrolapse 10^{-2} gm/kg per mb over 50 mb below cloud base and z = cloud thickness in mb. The majority (74%) of "no breaks" had $\xi < -20$, 76% of "breaks" had $\xi > -20$. Exceptions are discussed. *Subject Heading:* **1. Stratocumulus dissipation.**—*C.E.P.B.*

6.11–292 551.576.11

Malkus, Joanne Starr, **On the formation and structure of downdrafts in cumulus clouds.** *Journal of Meteorology*, 12(4):350–354, Aug. **1955.** 3 figs., 5 tables, 7 refs., eq. **DWB**—Downdrafts at the extreme down-shear edge of visible entraining trade cumulus, studied by airplane in the Caribbean, are considered to originate at the top of the cloud and on descending mix mainly with the updraft, the negative buoyancy being given by evaporation of part of the liquid water content. A graphical method of calculating up-and downdraft and entrainment is given. Owing to entrainment of updraft, a downdraft of 250 cm/s at 1560 m has almost disappeared at 793 m. The life cycle of the downdraft depends on that of the updraft; a late stage of the downdraft may be maintained by entrainment of, and evaporation into, clear air. *Subject Headings:* **1. Cumulus cloud structure 2. Caribbean Sea.**—*C.E.P.B.*

6.11–293 551.576.2:551.507.352

Khalevitskiĭ, Z. Z., **Neispol'zovannye vozmoshnosti ucheta prostranstvennogo praspredeleniia oblachnosti.** [Unutilized possibilities for the recording of areal distribution of cloudiness.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:32–33, Jan./Feb. **1955.** 2 refs. **DWB**—The author points out that the distribution of clouds, their thickness and other characteristics can be determined by visual observations from airplanes. The value of these observations is pointed out and suggestions for rendering them more precise are proposed. *Subject Headings:* **1. Areal cloudiness distribution 2. Visual observations from airplanes.**—*I.L.D.*

PRECIPITATION

See also: **British Rainfall 1953,** 6.11–16; **Cyclonic precip. analysis** (Reiss), 6.11–207; **Thunderstorm rainfall** (Carson), 6.11–235; **Drought effect on water resources** (Cushman, Halpenny), 6.11–309; **Rainy seasons** (Matsumoto et al.), 6.11–348.

6.11–294 551.577(481)

*Åmot, Audvin, **Nedbøren i Bergen gjennom 50 år.** [The precipitation in Bergen during 50 years.] *Naturen*, 79(3):74–84, **1955.** 10 tables. **DLC**—Tabulated data for 1904–1953 from Fredriksberg Station, Bergen, are statistically analyzed and discussed. Monthly, seasonal and annual mean values are presented for 10, 30 and 50-year periods. Maxima and minima for quarterly periods during the 50 years as well as seasonal distribution of annual precipitation

and variation between "dry" and "humid" seasons show great changes. Precipitation show decline in May and steady increase in Aug. during the 10-year periods. It is suggested tha annual leave for schools start in May rather than in Aug. since the precipitation in Aug. double that of May. *Subject Headings:* **1. Precipitation data 2. Long period records 3. Be gen, Norway.**—*W.N.*

6.11–295 551.577:551.

Gegenwart, Wilhelm and Ruppert, Karl, **Ein Versuch zur Feststellung der winterliche Bodenzerstörung.** [An attempt at a determination of winter soil destruction.] *Petermann Geographische Mitteilungen*, 99(1):21–23, **1955.** chart, 14 refs. **DLC**—The effect of winte weather on the erosion of soil depends not so much on the amount of rainfall as on a whol complex of natural features, of which the increase of frequency of snow lying with height i one of the most important. Snow melt over frozen soil causes the erosion of many channel Relief is also important. The chart shows three degrees; slight, moderate and severe. *Subje Heading:* **1. Soil erosion.**—*C.E.P.B.*

6.11–296 551.577:551.501.

Hajósy, Ferenc, **A meteorológiai állomások vízrajzi sorrendjéről.** [Indexing of weathe stations for hydrologic purposes.] *Időjárás*, 58(1):40–43, Jan./Feb. **1954.** Russian an French summaries p. 32. **MH-BH**—In precipitation tables of the Hungarian Meteorologica Yearbooks, precipitation stations are listed by catchment areas. The author discusses a fe discrepancies in the order of stations in the current listings and suggests the application c criteria which would render the lists more uniform. *Subject Headings:* **1. Precipitation net works 2. Hungary.**—*G.T.*

6.11–297 551.577(212, 213

*Schneider-Carius, K., **Die Niederschlagswahrscheinlichkeit als kennzeichnende Grösse in einer Darstellung der Physiognomie der Niederschläge.** [Rainfall probability as a char acteristic of precipitation.] *Zeitschrift für Meteorologie*, 9(6):161–169, June **1955.** 6 figs 3 tables, 10 refs. **MH-BH**—The more showery nature of the rainfall of Batavia compare with Potsdam is shown by tables and graphs of mean numbers of rains of different durations and mean numbers of days with different durations (both in %). The probabilities of dail rainfalls of different amounts (on a logarithmic scale) at Berlin in winter and summer an Batavia in west and east monsoons are analyzed into a number of partial Gaussian distributions Batavia east monsoon resembles Berlin summer (greatest probability about 4 mm), bu Batavia west monsoon has much larger individual amounts (greatest probability 16 mm) an Berlin winter much smaller (2 mm). *Subject Headings:* **1. Rainfall duration 2. Rainfal probability 3. Djarta 4. Berlin.**—*C.E.P.B.*

6.11–298 551.577:551.575.36:551.5

Troeger, Heinz, **Die Häufigkeit von Regen und Nebel.** [The frequency of rain and fog. *Annalen der Meteorologie*, 6(9/10):314–315, **1953/54.** fig., 2 eqs. **MH-BH**—At Hamburg % frequency h_R of rain is related to Beaufort wind force V by $\log h_R = 0.723 + 0.11\ V$. Fre quency h_N of fog is related to wind velocity v by $\log h_N = 1.283 - 0.20\ v$. *Subject Headings* **1. Wind effects on precipitation 2. Wind effects on fog.**—*C.E.P.B.*

6.11–299 551.577.1

Kalle, Kurt, **Zur Frage des "cyclischen Salzes."** [On the problem of "cyclic salt."] *Annalen der Meteorologie*, 6(9/10):305–314, **1953/1954.** 8 figs., 5 tables, 12 refs. Germa and English summaries p. 305. **MH-BH**—The distributions of chlorine (Cl) and sodiun (Na) ions in precipitation at 27 stations in Sweden are plotted. Ratios of Na, Ca and K to C greatly exceed those in sea water and rise considerably inland and to the north. This suggest that most of the Ca and K ions in rain are of land origin. Assuming that the sea is the sol source of Cl, the part of the Na, Ca and K which is of land origin is calculated. A hypothetica "primary dust" of lithosphere origin is postulated, depending on the nature of the rock, th Na of the soil being exchanged for the Ca and K of the rain. *Subject Headings:* **1. Precipitatio composition 2. Sweden.**—*C.E.P.B.*

6.11–300 551.577.2(41/42):551.577.3

Gregory, S., **Some aspects of the variability of annual rainfall over the British Isles for the standard period 1901–30.** *Royal Meteorological Society, Quarterly Journal,* 81(348): 257–262, April **1955.** 3 figs., table, 3 refs. **DWB**—Maps of mean deviation of the annual rainfall as a percentage of average are presented for 1901–30 and compared with those for 1881–1915 reproduced from **The Climatological Atlas of the British Isles,** showing appreciable differences. The extreme percentage range is also plotted. *Subject Headings:* **1. Rainfall variability 2. British Isles.**—*C.E.P.B.*

6.11–301 551.577.32 551.577.38

*Bultot, F., **Saisons et periodes seches et pluvieuses au Congo Belge et au Ruanda-Urundi.** [Drought and rain seasons in the Belgian Congo and in Ruanda-Urundi.] *Institut National pour l'Étude Agronomique du Congo Belge, Bureau Climatologique, Communication,* No. 9, **1954.** 70 p. 16 tables, 15 refs., 4 figs., 8 charts (fold.). **MH-BH, DLC**—The contents of this monograph are as follows: Mean dates of the beginning of the dry and rainy seasons and the mean duration of the dry season; propagation of the line of demarcation between the dry and rainy zones towards the equator and tropics, respectively; frequency of dry and rainy periods contained in the rainy season; and the drying power of the different Congo climates, including calculation of actual evaporation from a free saturated water surface by the method of heat energy balance, annual evaporation in different regions of the Belgian Congo, etc. Data are presented in tables and as isochrone and isopleth charts. *Subject Headings:* **1. Rainy seasons 2. Drought 3. Evaporation 4. Belgian Congo 5. Ruanda-Urundi.**—*I.L.D.*

6.11–302 551.577.34

Kraus, E. B., **Secular changes of east-coast rainfall regimes.** *Royal Meteorological Society, Quarterly Journal,* 81(349):430–439, July **1955.** 9 figs., 2 tables, 15 refs. **DWB**—Cumulative percent deviations of rainfall from normal (1881–1940) are shown for 5 stations on E. coast of U. S. Period 1901–40 shows a decrease, especially in summer and autumn and in the south. Inland stations do not show it. E. coast of Australia shows similar changes, decreasing poleward. They are less marked in Japan and on the China coast. In S. America and S. Africa the same pattern is present, but confused. The change is similar to the change from glacial to interglacial but the period of low rainfall may be ending. *Subject Heading:* **1. Rainfall trends.**—*C.E.P.B.*

RAIN AND SNOW

See also: **Snow and avalanches in winter,** 6.11–4; **Effect of heavy rainfall on turbojet aircraft operation** (Useller et al.), 6.11–71; **Reflection of sound at snow surface** (Oura), 6.11–362.

6.11–303 551.578.11

Turner, J. S., **The salinity of rainfall as a function of drop size.** *Royal Meteorological Society, Quarterly Journal,* 81(349):418–429, July **1955.** 6 figs., 7 refs., 3 eqs. **DWB**—Raindrops divided into size ranges near Sydney, Australia, near coast and 45 mi inland and 2850 ft were analyzed for sodium. For Bergeron type rain salinity varied from 1–41 p.p.m., roughly proportional to $(\text{radius})^{-n}$, where n ranged up to 2.6 near sea. Inland the salinity was lower but tended to increase slightly for $r > 1$ mm. These results are explained by evaporation and collection of salt during fall. Salinity of nonfreezing rain in Hawaii decreased from 2–20 p.p.m. on coast to 0.34–8.5 at cloud base and 0.26–3.8 in cloud at 4500 ft. It was least at drop diameter 0.8 mm (coast) to 0.5 (cloud). The salinity of large drops is attributed to formation on giant nuclei and coalescence at an early stage; the first drops to fall are large and of high salinity. *Subject Heading:* **1. Raindrop salinity.**—*C.E.P.B.*

6.11–304 551.578.41:551.578.81

Di Colbertaldo, Dino (*Univ. of Padova*), **La neve ocracea caduta a Cave del Predil il 7 Febbraio 1951.** [The ochre snow that fell at Cave del Predil, Feb. 7, 1951.] *Geofisica e Meteorologia,* Genoa, 2(3/4):37–42, May/Aug. **1954.** 10 figs., 2 tables, 2 refs. **MH-BH**—

A description is presented of the geographical location of Cave del Predil, the circulation factor determining the precipitation regime of this area, the meteorological situation that precede and accompanied the phenomenon and the meteorological and chemical composition of th ochre snow and of other dusts that fell in the Piedmont and in France during different period and of some African sands of Sistica (Libya) and Tunisia. It is concluded that the dust of th ochre snow is not of Saharan origin; it is possible that the dust came from Morocco or Algeria *Subject Headings:* **1. Yellow snow 2. Snow impurities 3. Cave del Predil, Italy.**—*I.L.D.*

6.11–305 551.578.4

Noth, H., **Vom Schneefall bei Temperaturen über null Grad.** [Snowfall with tem peratures above zero degree.] *Zeitschrift für Meteorologie*, Berlin, 8(6):182–183, June 1954 table. **MH-BH**—In spite of the fact that enough heat is present in the atmosphere to caus snow flakes to melt at temperatures above 0°C, snow flakes nevertheless fall and reach th ground. A case of snow fall at +2.6°C dry bulb and +0.6°C wet bulb is explained by th fact that snow has a high surface curvature which is characterized by high vapor pressure an evaporation while falling through relatively unsaturated air. The snow flakes cool mor rapidly than the wet bulb thermometer. *Subject Heading:* **1. Snow above freezing point** —*I.L.D.*

6.11–306 551.578.46:551.588.

Chomicz, Kazimierz, **O pokrywie śnieznej w Karpatach.** [The snow cover in the Car pathians.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(1/2):15–29, **1953.** 4 figs 6 tables, 3 refs., 4 eqs. French summary p. 29. **DWB**—An investigation of the effect c increase of continentality and altitude on the thickness and continuance of snow cover in th Carpathian Mountains is presented. On the basis of statistical data for a period of 10 years it is shown that the effect of continentality (the area was divided into 2 meridional zone west and east of long. 21°) is not large and varies within the limits of from 3% to 10%. *Subjec Headings:* **1. Snow cover 2. Snow cover duration 3. Continentality 4. Carpathians.**— *A.M.P.*

6.11–307 551.578.46:656:55

Kilfoil, W. P., **Canada tests new idea to eliminate ice.** *Highway Magazine*, Middletown Ohio, 46:21–22, Jan. **1955.** photo. **DWB**—A de-icing substance has been invented by a German engineer, WILHELM RADEMACHER, which has been tested on a strip of road nea Frederickton, New Brunswick, and found to relieve snow or ice conditions at temperature above zero (F), and to improve conditions at lower temperatures, when compared with non impregnated strips of asphalt. It is said to work on concrete and to be applicable to airport as well as highways. Cost is $4000/mi for a 20 ft wide strip. *Subject Headings:* **1. Snow an ice removal from roads 2. Highway engineering 3. New Brunswick, Canada.**—*M.R.*

6.11–308 551.578.46:551.524.

Lowry, William P., **Further remarks on the correlation of density of new snow wit 700-millibar temperature.** *Journal of Meteorology*, 12(4):414, Aug. **1955.** ref. **DWB**— Supplement to paper by M. DIAMOND and W. P. LOWRY (*see* 6.5–256, May 1955, *MAB*) *Subject Headings:* **1. Snow density 2. Upper air temperatures.**—*C.E.P.B.*

HYDROMETEOROLOGY

See also: **Coordination of met. and hydrol. services in Sweden, 6.11–37.**

6.11–309 551.579:551.577.3

Cushman, R. L. and Halpenny, L. C. (*U. S. Geol. Surv., Tucson*), **Effect of western drough on the water resources of Safford Valley, Arizona, 1940–1952.** *American Geophysical Union Transactions*, 36(1):87–94, Feb. **1955.** 4 figs., 7 refs. **MH-BH**—Records of precipitation runoff in the Gila River, ground-water withdrawals for irrigation, and changes in ground-wate level in Safford Valley, Arizona, provide a basis for noting the effect of wet and dry period on the hydrologic cycle. An unusually wet period, 1940–1941, was followed by a period o drought, 1942–1952. The irrigable area is limited by natural causes, the area irrigated with

surface water is effectively limited by court decree, and less than 1000 acres are irrigated exclusively from wells. Thus relatively little expansion in this irrigated area has occurred during the period concerned to obscure the climatic effects, although cultivation has been more intensive in recent years and the water demand has been correspondingly larger. The wet period of above-normal stream flow and ground-water levels provided a cushion that delayed and reduced the effects of the drought. As the ground-water storage in the valley is relatively small, however, withdrawals of ground-water as a supplemental supply for irrigation eventually lowered water levels sufficiently to reduce well yields. The concentration of dissolved mineral matter increased in the remaining ground water, making it less desirable for irrigation use than previously. *Subject Headings:* **1. Hydrologic cycle 2. Safford Valley, Arizona.**—*Authors' abstract.*

6.11–310 551.579

Tabita, Angelo (*Chief, Hydrol. Sec. Planning and Reports Branch, Corps of Engrs., Jacksonville*), **Hydrology characteristics. Central and Southern Florida project.** *American Society of Civil Engineers, Proceedings*, Vol. 80, Separate, No. 520, Oct. **1954.** 38 p. 21 figs., table. **DWB**—Hydrologic investigations within the area served by the Central and Southern Florida Project consider the behavior of water as it occurs in the atmosphere, on the surface of the ground, and underground. In connection with the planning and design of water-control works contained in the project, the principal hydrologic factors of rainfall, run-off, evapotranspiration, infiltration, and ground water storage are resolved to solve problems relating to the regulation, control, and utilization of water. This paper deals principally with climatic characteristics, the behavior of surface and ground water within the project area, the methods of collecting basic water-level and stream flow data, and the analysis and use of such data. *Subject Headings:* **1. Hydrologic studies 2. Runoff 3. Ground water 4. Water conservation 5. Florida.**—*Author's abstract.*

6.11–311 551.579.1

Nash, J. E. and Farrell, J. P., **A graphical solution of the flood-routing equation for linear storage-discharge relation.** *American Geophysical Union, Transactions*, 36(2):319–320, April **1955.** 4 figs., 3 eqs. **MH-BH**—The problem of routing floods through reservoirs where the storage is a linear function of the outflow is treated, and a simple, rapid, and accurate graphical method of obtaining the discharge from the inflow is presented. *Subject Headings:* **1. Flood control 2. Graphical presentation.**—*Authors' abstract.*

6.11–312 551.579.3

Glen, J. W., **The stability of ice-dammed lakes and other water-filled holes in glaciers.** *Journal of Glaciology*, 2(15):316–318, April, **1954.** 6 refs. English and German summaries p. 316. **DWB**—An empty hole more than 15–20 m deep in a glacier will fill in owing to inward pressure of ice, but a water-filled hole will expand owing to outward pressure of water. Thus glacier lakes like Tulsequah will form a tunnel under the glacier and periodically empty, flooding the valley. *Subject Heading:* **1. Glacial runoff.**—*C.E.P.B.*

6.11–313 551.579.4:627.51

Aki, Koichi (*Tokyo Univ., Japan*), **Some problems on flood control in Japan.** (In: UNESCO Symposium on Typhoons, Tokyo, Nov. 9–12, 1954, **Proceedings,** pub. **1955.** p. 17–21.) **DWB**—The majority of floods are caused by heavy rainfall accompanying typhoons. The damage is estimated at almost fifty billion yen annually. Flood control work has long been practiced in every country but the damage has not been diminished. Any attempt to prevent flood damage must be based on anticipation of possible floods; according to our recent studies we noticed that the maximum discharge of any flood is completely dependent upon the conditions of run-off and of flow through the channels. The maximum discharge of a river varies with the human activities in that river basin. We are now gaining an understanding that the relations which govern the forms of flood flow should be made clear for predicting maximum discharge and that this will give us some basic data for flood control works which will stabilize the river. *Subject Headings:* **1. Flood control 2. Runoff 3. River discharges 4. Japan.**—*From author's abstract.*

6.11–314 551.579.4:551.583.

Langbein, Walter B. (*U. S. Geological Survey*), **Trends in stream flow and ground wat data and their significance in water supply appraisal.** (In: Pennsylvania Electric Associatio Hydraulic Power Committee, **Symposium on climatic trends in Northeastern United State April 22–23, 1952, Minutes. 1952.** p. 42–50. **Discussion.** *Ibid.*, p. 51–54.) **DWB**— Elaborate graphical analysis of stream flow records dating in some places back to 1820, giv an idea of fluctuations in rainfall and temperature (through evapotranspiration). Streamflo sometimes exaggerates climatic anomalies. Persistence effects are more significant in strear flow than in rainfall records. Forecasts from cyclical or persistence statistics must take in account storage, artificial factors and representation of data; also persistence decreases i dependence of data. No trend which could not be attributed to random sequences or runs wet or dry years has been detected yet. *Subject Headings:* **1. Stream flow as climatic indicat 2. Persistence 3. Climatic trends.**—*M.R.*

6.11–315 551.579.4:551.515.2(73/

Nelson, Elmer R. (*U. S. W. B., Wash., D. C.*), **Floods of 1954.** *Weatherwise*, 8(1):18–1 Feb. **1955.** photos. **DWB**—A month by month account of 1954 floods in the United Stat is presented. The role of hurricane Hazel in flood occurrence is described. *Subject Heading* **1. Floods 2. Floods, United States (1954) 3. Hurricane "Hazel" (1954) 4. United State** —*I.L.D.*

6.11–316 551.579

Szilágyi, József, **Az Átalér és a Vali-víz rendkívüli árvize 1953. jún. 9-én.** [The exception flood of Átalér and Vali-víz streams on June 9, 1953.] *Vízügyi Közlemények*, Budapes No. 2:169–176, **1954.** 3 figs., 3 tables. **DLC**—This analysis of an exceptionally inten local flood affecting two small streams in northwestern Hungary includes descriptions of t region, meteorological development and history of the flood and determination of maximu flow by means of traces of river deposits. The chapter on meteorology contains a brief synop summary and a map and table of rainfall distribution. At the shower center a rainfall amou of 220 mm was measured in less than 3 hrs, which exceeds any 24-hr amount of the last years and is three times the highest 40-year monthly average value for June of any station the watershed. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Hungary.**—*G.T.*

6.11–317 551.579

*U. S. Corps of Engineers. Snow Investigations, **Analysis of January 1953 rain on snc observations at Central Sierra Snow Laboratory, Soda Spring, California.** Its *Research No* No. 18, May 15, **1954.** 20 p. 2 tables, 9 plates (fold.), foot-refs. **DWB**—The availab observations are discussed briefly. The snow melt at the headquarters lysimeter during rain storm is evaluated by water-balance and by heat-budget methods. An equation f snow melt is presented in which the hourly snow melt is given in terms of the ordinarily ava able data on rainfall, air temperatures, and wind speed. Satisfactory reconstitution of t observed hourly runoff from the lysimeter is made by routing the hourly inflow (consisting rainfall and melt, less permanent storage) by distribution graph and Muskingum routi methods. *Subject Headings:* **1. Snow melt 2. Snow melt runoff 3. Lysimeter observatio 4. Central Sierra Snow Laboratory, California. I. Boyer, P. B.**—*Author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See: **Course in climatology** (Alisov et al.), 6.11–5; **Conference on Climatology in Wrocław** (Schmuck), 6.11–40.

CLIMATIC ZONES

6.11–318 551.311.3 551.581(9

*Fristrup, Børge, **Wind erosion within the Arctic deserts.** *Geografisk Tidsskrift*, Cope l agen, 52:51–65, **1952/53.** 5 tables, photos, diagrs., refs. p. 64–65. **DWB**—A brief accou

f the climatic characteristics of the high Arctic deserts in Greenland and Arctic North America, ncluding temperature and wind data for Brönland Hus (1948–50), mean monthly frequency f wind velocity at Jörges Brönlands Fjord and temperature and wind velocity at Mt. Evans data of J. E. CHURCH, 1941) is presented. The nature of wind erosion in Arctic deserts, ncluding wind polishing, ice hardness, seasonal variations of wind curves, etc., is discussed. Also a comparison is made between wind erosion in the Arctic deserts and that in tropic and ubtropic deserts. *Subject Headings:* **1. Climatic data 2. Arctic deserts 3. Wind erosion 4. Climate of the Arctic 5. Greenland 6. Arctic.**—*I.L.D.*

6.11–319 551.581

Niemeyer, Wolfgang (*Hamburg*), **Klima und Wetterdienst.** [Climate and weather ervice.] (In: Schmidt, George A. and Marcus, August (*eds.*), **Handbuch der Tropischen und Substropischen Landwirtschaft,** v. 1. Berlin, Mittler, **1943.** (Lithoprinted, Ann Arbor, Michigan, Edwards, **1945.**) p. 14–35. 15 figs., 16 refs.) **DLC**—The chapter on climate and veather service gives brief but pertinent facts about weather observations, climatic phenomena peculiar to hot regions, the climatic zones of the tropics and subtropics, and the economic and physiological significance of climate in the tropics and subtropics, with special emphasis on conditions affecting plantations or planters. Isohyetal air flow and Köppen's classification charts, plus temperature and precipitation diagrams showing seasonal variations at selected stations in the warmer regions, are presented by way of illustration. *Subject Headings:* **1. Tropical climatology 2. Climate of the tropics 3. Tropics 4. Subtropics.**—*M.R.*

CLIMATE OF PARTICULAR PLACES

See also: **Climate and bioclimate in Vienna** (Steinhauser et al.), 6.11–17; **Climatological atlas of Canada** (Thomas), 6.11–92; **Climate of Sokolowsk** (Schmuck), 6.11–344.

6.11–320 551.582(988)

*Georgi, Johannes, **Bemerkungen zum Klima von "Eismitte," Grönland.** [Remarks on the climate of Eismitte, Greenland.] *Annalen der Meteorologie,* 6(9/10):283–295, **1953/1954.** 3 figs., 6 tables, 14 refs. **MH-BH**—Eismitte on the Greenland Ice Cap at 3000 m is characterized by low temperature and medium annual range. This is due to outward radiation and small specific heat of firn. Thermal climate is summarized monthly for 1930/31, 1949/50 and 1950/51. Monthly temperatures run parallel to (but much lower than) west coastal stations of Greenland though with some differences; there is evidence of a month's lag, coast behind Eismitte. The author discusses question of a progressive warming and concludes that there is no evidence for it, but an editorial note disagrees with this. *Subject Headings:* **1. Local climates 2. Climate of Eismitte, Greenland 3. Greenland.**—*C.E.P.B.*

6.11–321 551.582(669):551.586:612

*Port Harcourt, Nigeria. Tropical Testing Establishment, **Notes on the climate of Nigeria with reference to personnel.** Its *Technical Report,* No. 355, **1955.** 20 p. 8 figs., 12 tables, foot-refs. Mimeo. **GB-MO**—Subjective feelings at stations in Nigeria ranging from hot-wet (Port Harcourt) to semiarid (Kano) were compared with instrumental temperatures and humidities, and effective temperatures. At Port Harcourt hot humid nights make sleep difficult above effective temperature of 82° but it seldom exceeds 83° and can be reduced to 79.5° by ventilation. The climate is summarized and hourly observations given for typical days. Effective temperature, given by $WB+(DB-WB)/3-V$(m.p.h.) is a fairly accurate measure of subjective discomfort, with a correction for radiation based on readings of a globe thermometer. Travel in cars is made less uncomfortable by painting the top white, reducing inside temperature by 8°F. *Subject Headings:* **1. Bioclimatic research 2. Effective temperature 3. Nigeria.**—*C.E.P.B.*

6.11–322 551.582(81)

Simões, Ruth Mattos Almeida, **Notas sôbre o clima do Estado do Paraná.** [Notes on the climate of Paraná State.] *Revista Brasileira de Geografia,* Rio de Janeiro, 16(1):126–132,

Jan./March **1954.** table, diagrs., ref. **DWB**—The description of the climate of Paraná contains 2 maps: one showing the distribution of rainfall normals and the other that of tem perature normals. A table giving the mean annual temperature, mean of the coldest and warmest Jan. and July and mean max. and mean min. for a number of stations is included *Subject Headings:* **1. Climate of Paraná 2. Paraná, Brazil.**—*I.L.D.*

6.11–323 551.582.2(485

*†Angström, Anders, **Norrlands klimat.** [Climate of Norrland (Sweden).] (In: Lund qvist, Magnus *(ed.)*, **Norrland: natur, befolkning och näringar.** Litografiska Anstalt, **1942** p. 51–92. 20 figs., 31 refs., plate (fold.). Note: This is also issued as *Ymer*, Stockholm 62(3/4), **1942. DLC**—Norrland comprises all of Sweden from 60° to 69° lat. and has an exceedingly variable climate. General climatic conditions, temperature, phenology, ice formation and breakup, snow cover, frost, precipitation, wind, haze, solar radiation and climatic variations are described. Nicely prepared charts show general variation in the above elements over all of Sweden. Data are also presented in tables and in graphs and histograms *Subject Headings:* **1. Climate of Norrland, Sweden 2. Climatic data 3. Norrland, Sweden** —*M.R.*

6.11–324 551.582.2(436) 551.506.1

*Austria. Zentralanstalt für Meteorologie und Geodynamik, **Nachträge zu den im Reseau Mondial veröffentlichen Klimadaten von Wien—Hohe Warte für den Zeitraum 1935–1949.** [Supplement to the Réseau Mondial. Climatic data for Vienna-Hohe Warte 1935–1949.] Vienna, May **1954.** 11 p. almost entirely tables. **DWB**—Standard Réseau Mondial data tables are given for each year from 1935 to 1949 for Vienna. Normals for 1851–1920 for pressure, 1775–1920 for temperature, and 1851–1920 for precipitation are used in computing departures from normal. Each table consists of monthly and annual mean station and sea level pressure; average max., min. and average temperature and extreme max. and min temperature, mean 24 hourly temperature; and total precipitation, with departure for each *Subject Headings:* **1. Climatic data 2. Réseau Mondial 3. Vienna, Austria. I. Great Britain Meteorological Office, Réseau Mondial.**—*M.R.*

6.11–325 551.582.2(548.7

*Ceylon. Dept. of Census and Statistics, **Statistical abstract of Ceylon, 1949, 1950** 2 v. Price: Rs 9.25 from Govt. Publications Bureau, Colombo. Alphabetical subject index (*see* titles under Climate, Meteorological conditions). **DLC**—Sec. I of this voluminous statistical report, entitled Area and Climate, contains 10 pages of data on mean monthly and annual temperature, relative humidity and rainfall for each year from 1937 to 1948 (or 1949 in the 1950 ed.) inclusive, and average for 20–30 years for 9 stations in different parts of Ceylon Colombo, Jaffna, Trincomalee, Hambautota, Ratnapura, Anuradhapura, Kandy, Diyatalawa and Nuwara Eliya. Relative humidity and rainfall normals given for 1911–40. *Subject Headings:* **1. Climatic data 2. Climate of Ceylon 3. Ceylon.**—*M.R.*

CLIMATIC CHANGES

See also: **Summer temps. and tree-rings** (Schove), 6.11–230; **Stream flow as climatic indicator** (Langbein), 6.11–314.

6.11–326 551.583:550.93:546.79

Brannon, H. R.; Traggart, M. S., Jr. and Williams, M., **Proportional counting of carbon dioxide for radiocarbon dating.** *Review of Scientific Instruments*, N. Y., 26(3):269–273 March **1955.** 6 figs., table, 7 foot-refs. **DLC**—Determination of naturally occurring radiocarbon has been made with proportional counters filled with carbon dioxide at pressures up to 10 atmospheres. After chemical and radiochemical purification, the sample is converted into carbon dioxide for the counter filling. Extreme purity is required of the counter filling gas to prevent electron attachment by impurities. Procedures are described for producing carbon dioxide of sufficient purity to provide consistent and reproducible results. A counting efficiency of 100% is obtained for carbon-14 betas contained in the active volume of the counter giving a sample counting rate for the counter used of 45 cpm for contemporary material at a

ling gas pressure of 10 atmospheres. With the present background of 13.5 cpm and a count-g time limit of two days, dating may be extended to a maximum age limit of 42,000 years. *ubject Heading:* **1. Radiocarbon dating.**—*Authors' abstract.*

6.11–327 551.583

Geller, S. Iu., **O klimaticheskikh periodakh.** [Climatic cycles.] *Vsesoiuznyĭ Geo-aficheskiĭ s"ezd, 2nd, Leningrad, 1947, Trudy,* 2:215–216, **1948. DLC**—The idea of climatic eriods, extensively studied in the U. S., Germany and France, received little attention Russia because of Voeĭkov's opposition to Köppen's and Bruckner's ideas. Direct bservations and indirect evidence (tree rings and varves) permit the study of long and seem-gly uniform series. In recent years investigations of periodicity have been made in Leningrad y astrophysicists for long range forecasting of Caspian Sea level changes. The author sapproves of the further development of this trend for the following reasons: 1) Observational ata used for revealing the periodicity are not uniform over a long period; 2) The factors etermining the changes of tree rings, thicknesses, etc. are not clear; 3) Previously established eriods have been disproved by actual observations; 4) The physical basis for the periodicities hich have been discovered is obscure and it is also not clear why soil climatic periods should xist at all. (*See also* 2.4–165, April 1951, *MAB.*) *Subject Headings:* **1. Climatic variations Periodicities 3. Climatic classification.**—*A.M.P.*

6.11–328 551.583.3

Mather, John R. (*Johns Hopkins Univ. Lab. of Climatology, Seabrook, N. J.*), **The resent climatic fluctuation and its bearing on a reconstruction of Pleistocene climatic condi-ons.** *Tellus,* 6(3):287–300, Aug. **1954.** 6 figs., 2 tables, 15 refs. **MH-BH**—Study of the road scale pressure, temperature, and precipitation changes which have occurred over the orthern Hemisphere during the last forty years gives considerable information concerning he nature and mechanics of a climatic change. If it is assumed that these small-scale changes esemble in certain aspects those that have occurred in the great glacial to interglacial changes the Pleistocene period, conclusions concerning the broad scale meteorologic conditions of hat period can be drawn. Evidence from synoptic meteorology is also used to reveal possible rculation changes accompanying the shift from a glacial to an interglacial period. Certain leas obtained from these studies are further investigated by means of more detailed studies ver North America. *Subject Headings:* **1. Climatic variations 2. Pleistocene climate lculations 3. Northern Hemisphere.**—*Author's abstract.*

6.11–329 551 583.3:551 586:581.9

†Moreau, R. E., **Ecological changes in the Palaearctic Region since the Pliocene.** *Zoo-gical Society of London, Proceedings,* 125(1):253–295, May **1955.** 7 figs., 2 tables, 179 refs. **LC**—Begins with a summary of the present distribution of vegetation. Then follows a iscussion of the meteorology of Europe and Siberia during the Ice Age. The changes of imate, land areas and especially vegetation during the Pleistocene are described. In the st glaciation trees were practically eliminated from Europe north of the Pyrenees, southern lps and Carpathians but existed all across Siberia. The interglacials and interstadials are iscussed; in the last interglacial the vegetation zones were further north than at present. he paper is richly documented. *Subject Headings:* **1. Quaternary climates 2. Bioclimatology Plant distribution 4. Europe 5. Siberia.**—*C.E.P.B.*

6.11–330 551.583.3:598.2:551.79

Moreau, R. E., **The main vicissitudes of the European avifauna since the Pliocene.** *bis,* London, 96:411–431, **1954.** 2 figs., 29 refs. **DLC**—The climatic sequence of the Quater-ary is summarized and the distribution of vegetation plotted. From this and a few fossils he distribution and migrations of birds with different habitats are inferred. *Subject Headings:* **Quaternary climates 2. Birds 3. Europe.**—*C.E.P.B.*

6.11–331 551.583.13:517.512.2

Polli, Silvio (*Istituto Talaseografico, Trieste*), **Criteri di realtà fisica per un ciclo climatico.** Criteria of physical reality for a climatic cycle.] *Geofisica e Meteorologia,* Genoa, 2(3/4):33–

36, May/Aug. **1954.** fig., 17 refs. **MH-BH**—The author examines cycles of climatic elements obtained by means of the periodic analysis methods of SCHUSTER and VERCELLI applied to successive annual means of temperature, precipitation, humidity, atmospheric pressure, etc. There were determined quasi-periodic and quasi-persistent oscillations having periods of 11.5, 5.6, 4.8 and 16 yrs. The period of 22.3 yrs is generally less pronounced. *Subject Headings:* **1. Climatic cycles 2. Periodogram analysis**—*I.L.D.*

6.11–332 551.583.7:551.76

*Lowenstam, H. A. (*Cal. Inst. of Tech.*) and Epstein, S. (*Chic. Univ.*), **Paleotemperatures of the post-Aptian Cretaceous as determined by the oxygen isotope method.** *Journal of Geology,* Chicago, 62(3):207–248, May **1954.** 22 figs., 4 tables, refs. **DWB**—Using the oxygen isotope method for measuring temperature, the author investigated the paleotemperatures of the post-Aptian Cretaceous. Samples of belemnite guards, inoceramus, brachiopod and oyster fragments, chalks and bioclastic matrix materials collected from Western European localities and the southeastern part of the United States and a few samples from Japan, India, Australia and Algeria were used. The resulting measurements indicate a progressive rise in ocean temperatures from the Cenomanian, climaxing in the Coniacian-Santonian followed by a general decline to the Maestrichtian. The study indicates that during the Coniacian-Santonian temperature climax, marginal subtropical ocean temperatures extended northward into the present-day cold temperature belt with this northward displacement decreasing toward Maestrichtian time. A study of the temperatures recorded by the well-preserved elements of the Maestrichtian Coon Creek assemblage from Tennessee permitted a comparison with the recorded temperatures of the present day Bermuda belt; the temperature of these two groups show a parallelism. *Subject Headings:* **1. Paleoclimates 2. Cretaceous.**—*Based on authors' abstract.*

MICROCLIMATOLOGY

See also: **Cooling of cargoes by air conditioning** (Macht), **6.11–68.**

6.11–333 551.58

Fel'dman, IA. I., **Nekotorye rezul'taty mikroklimaticheskikh issledovaniĭ v Prikaspiĭsko Nizmennosti.** [Some results of microclimatic investigations in the Caspian Plain.] (In Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti.** Moscow, **1953.** p. 42–53. 4 figs. refs.) **DLC**—An analysis of results of microclimatic investigations carried out in 1951 by the climatological section of the expedition sent out by the Institute of Geography to the Caspian plains. The investigations were carried out on different underlying surfaces: irrigated land, afforestated areas, near water reservoirs and on a steppe surrounding them. The results permit qualitative judgments of changes in the physical conditions of the lowest (2m) atmospheric layer and, consequently, of local dry weather conditions which are associated with the character of the underlying surface and the velocity of dry winds. It has been shown that humidification of soil conditions of the Caspian semi-desert leads to such a considerable change of temperature and humidity in the lowest air layer that it results in an essential transformation of the weather. A classification of droughts according to temperature and humidity characteristics is given in tabular form and the diurnal march of these elements is presented in graphs for several microclimatic points. *Subject Headings:* **1. Microclimatological research 2. Cover influences 3. Drought 4. Caspian Plain, U.S.S.R.**—*A.M.P.*

6.11–334 551.58

Galakhov, N. N., **Sviaz' khoda otdel'nykh meteorologicheskikh elementov s pogodoĭ** [The relationship between the variation of meteorological elements and the weather.] (In Akademiia Nauk, SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti.** Moscow, **1953.** p. 54–64. 6 figs. 2 tables.) **DLC**—The first part of the paper is an analysis of dynamics of vertical temperature gradients, relative humidity and saturation deficit according to observations made at 0.2 and 1.5 m height under varying weather conditions. In the second part, the author deals with

riods of dry wind weather of varying intensity (4 groups). *Subject Headings:* **1. Micro-matological variations 2. Dry winds 3. Caspian Plain, U.S.S.R.**—*A.M.P.*

6.11–335 551.584

Liakhov, M. E., **Mikroklimaticheskie nabliudeniia v raĭone Chernogo lAra Astrak-noskoĭ Oblasti.** [Microclimatic observations in the District of Chernyi lAr, Astrakhan egion.] In: Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikrokli-aticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti.** Moscow, **1953.** 86–93. 7 figs., refs. **DLC**—Methods and results of microclimatic observations carried out the summer 1951 by a climatological group of the Caspian expedition of Moscow University study the influence of the Lower Volga on air temperature, humidity and the moisture eficit of air of surrounding areas and the extension of this influence to the right bank of the ver, where dry winds prevail in summer. It is shown that although the observed elements are nsiderably changed by their passage over the river, the width of the zone of this influence very restricted and does not exceed 500–1000 m. In spite of the fact that dry winds are eakened on the right bank and their recurrence is reduced, the vegetative cover is considerably orer than on the left bank. This is because the right bank is much higher (20 m above the ver level) and ground waters are found at a considerable depth below the soil layer. *Subject eadings:* **1. Microclimatological observations 2. Dry winds 3. Astrakhan Region, U.S.S.R.** *A.M.P.*

6.11–336 551.584.3:63(521.81)

*Akai, Seiko, **A meteorological study of the dunes of Tottori, pt. 1.** *Journal of Meteoro-gical Research*, Tokyo, 6(8):352–359, Nov. **1954.** 5 figs., 6 tables, 3 refs. In Japanese; nglish summary p. 352. **DWB**—The present paper is the first full report which shows the sults of geophysical observations carried out by the author and his collaborators at the dune Tottori to obtain basic data for agriculture on the dunes. The observations are as follows: earth temperature and micrometeorological observation near the ground surface; 2) depth, stribution, nature, density and temperature of snow on the ground; and 3) limnological bservation of Tanega-ike. *Subject Headings:* **1. Agricultural climatology 2. Earth tem-erature 3. Snow cover 4. Limnological observation 5. Tottori, Japan.**—*Author's abstract.*

6.11–337 551.584.3:551.555.4:551.311.12

Negri, N. C., **Winter observations on a zone of climatic modification in the Norwegian rctic.** *Nature*, London, 176(4476):292–293, Aug. 13, **1955. DWB**—The basin at the head a fiord on the Lyngen peninsula is surmounted in winter by an inversion of 10°F in 1000 ft. he lowest temperatures occur at the base of a wide defile leading to a glacier-filled cwm at 500 ft. The details of the flow of cold air are described. *Subject Headings:* **1. Glacier winds Microclimatology of fiords 3. Norwegian Arctic.**—*C.E.P.B.*

6.11–338 551.584.41

Takechi, Osamu and Kikuchi, Jyuji (*Matsuyama Agric. College*), **Study on the micro-eteorology in the citrus-orchards different only in the tree density, Pt. 1.** *Journal of Agri-ultural Meteorology*, Tokyo, 9(3/4):115–118, Aug. **1954.** 4 figs., 3 tables, refs. In Japanese; nglish summary p. 118. **MH-BH**—The microclimates in two citrus orchards (differing nly in tree density) were observed in the summer of 1953. Fig. 1 shows a continuous record insolation in two orchards, thickly or thinly wooded, for two days. The total insolation the thick orchard is only 63% of that in the thin one. The daily march of humidity is own in Fig. 2, where the relative humidity in the day time in the thick orchard is lower than at in the thin one. The vertical distributions of temperature under the crown are shown in ig. 3. In the thick orchard, the outer active surface and with it the consequent temperature aximum is located near the top of the crown. On the other hand, in the thin orchard the uter active surfaces are located rather below the crown surface. Fig. 4 show the daily march soil temperature at various depths within the ground and shows the contrast between the ick and the thin orchards. *Subject Headings:* **1. Orchard microclimatology 2. Tree density ffects.**—*Authors' abstract.*

CLIMATIC CLASSIFICATION

6.11–339 551.58

Chatterjee, S. B., **Climo-statical regions.** *Geographical Review of India*, 15(1):36–5 March **1953.** 3 tables, 2 maps, 12 refs. **DLC**—The author develops the concept of climo statical regions which involves the grouping of the various types of weather and climat according to some classification suitable for India. The frequency and behavior of individua weather elements are described by their modal and the extreme higher and lower values. It application to classifying the Indian climate into various regions is illustrated and the class fication is compared with the Köppen classification. *Subject Headings:* **1. Climatic classi fications 2. Köppen's classification 3. India.**—*I.L.D.*

6.11–340 551.585.53:061.

Smith, C. G., **An international symposium on desert research.** *Geographical Studie* London, 1(1):76–80, **1954.** foot-refs. **MH-BH**—Summaries of papers in the UNESC symposium of May 7–14, 1952 at Jerusalem. *Subject Headings:* **1. Desert climates 2. Dese research 3. Symposia.**—*C.E.P.B.*

6.11–341 551.585.55:634.5

Carrante, V. and Sparapano, N., **La microfertirrigazione del mandorlo.** [Micro fertiliz tion-irrigation of almond orchards.] *Convegno Nazionale del Mandorlo, 1st, Fiera del Levant Italy, Sept. 13, 1953, Atti.* 10 page reprint, pub. June **1954.** table. Abstracted from reprin **DWB**—In the semi-arid region of Puglia, where almonds are grown, the variability of rainfa and of productivity is very great. Statistical tests have been made for 2 years (1951–53 at Bari Agricultural Experiment Station to see what effect variation of irrigation moisture i limited quantities has on productivity of almonds. *Subject Headings:* **1. Micro-irrigatio 2. Arid zone agriculture 3. Arid zone irrigation 4. Almonds 5. Puglia, Italy.**—*M.R.*

6.11–342 551.585.7:551.311(64/5

†Wiche, Konrad, **Klimamorphologische und talgeschichtliche Studien im M'Goungebie Bericht über eine Reise in den Hohen Atlas.** [Studies on the climatic morphology and valle development of the M'Goun region. Report of a journey in the High Atlas.] *Geographisch Gesellschaft, Vienna, Mitteilungen*, 95(1/6):4–41, **1953.** 17 photos, chart, 35 refs. **DLC** The geomorphology of the M'Goun region manifests the effects of climate, for above 2700 m begins the zone of maximum frost frequency which facilitates mechanical erosion and intens soil fluxion. At lower elevations, wind effects are important geomorphological factors During the Pleistocene the climate of the High Atlas was cooler and moister than at present *Subject Headings:* **1. Climatic morphology 2. Soil erosion 3. High Atlas, Africa.**—*I.L.D.*

BIOCLIMATOLOGY

See also: **Weather of 1954** (Royal Met. Soc.), 6.11–115; **Heat load and voluntary toler ance time** (Craig et al), 6.11–228; **Pressure drop sickness** (Benzinger, Hornberger), 6.11–245; *see also* special bibliography on **Cooling power and its measurement,** p. 1622. **Climate of Nigeria** (Port Harcourt, Nigeria. Trop. Testing Estab.). 6.11–321; **Eco logical changes** (Moreau), 6.11–329.

6.11–343 551.586:159.9:632.1

Yamaguchi, S. (*Disaster Prevention Res. Inst., Kyoto Univ.*), **The effect of human mistake on fire.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 32(1):16–21, Jan. **1954.** 3 table 8 refs., 6 eqs. In Japanese; English summary p. 16. **MH-BH**—The author statistically ascertains the influence of weather on the mental state of man as reflected in fire statistics *Subject Headings:* **1. Psychological effects of weather 2. Fires.**—*Author's abstract.*

6.11–344 551.586:615.8 551.582.1(438

*Schmuck, Adam, **Klimat Sokołowska jako przyład klimatu miejscowosci leczniczej Sudetach.** [The climate of Sokolowsk as an example of a health resort in the Sudetes.

asopismo Geograficzne, Warsaw, 23/24:148–165, **1952/53.** 16 tables, 3 figs. **DLC**—Char-teristics of the climate of Sokolowsk, a tuberculosis health resort located in the narrow lley of the Scinavka River in the Riesengebirge in Upper Silesia close to the Czechoslovak undary line, are outlined and discussed. The observation of meteorological elements (air mperature, humidity, wind force and direction, cloudiness, precipitation) carried out by the thor during the period Dec. 1950–Nov. 1951 at the resort (560 m altitude) and simultane-sly at other higher situated points show that one of the main features of Sokolowsk climate its calmness and coolness, longer winter and shorter summer, greater humidity and greater nount of precipitation and cloudiness in comparison with other areas. *Subject Headings:* **Medical climatology 2. Health resorts 3. Climate of Sokolowsk, Poland 4. Sokolowsk, oland.**—*A.M.P.*

6.11–345 551.586:616.2

Ordman, David, **Graphical method of comparing climates in the study of perennial spiratory allergy.** *South African Journal of Science*, Johannesburg, 51(6):187–189, Jan. **55.** 4 figs. **DWB**—Experience has shown that the incidence of perennial respiratory ergy—bronchial asthma and allergic sinusitis and rhinitis—is considerably higher in the astal than in the inland areas of Southern Africa. Sufferers at the coast tend to improve moving inland and patients inland to become worse at the coast. The difference in climate pears to offer an explanation in many of these cases. The significant climatic factors involved e considered to be high relative humidity in combination with high temperature. Diagrams owing the average monthly relative humidity and temperature data for morning and after-on reveal climate patterns which are significantly different for coastal and inland towns. ese climate patterns may guide the physician in regard to climate in his therapeutic ap-oach to his patients with perennial respiratory allergy. Although the climate patterns scribed are regarded essentially as of value in respiratory allergy studies, similar patterns sed on the same or other climatic data will, it is thought, be of value in the study of other spiratory diseases and of ecological problems. *Subject Headings:* **1. Medical climatology Respiratory diseases 3. Coastal climates 4. South Africa.**—*Author's abstract.*

6.11–346 551.586:633.1

Pascale, Antonio Juan and Damario, Edmundo Alberto (*Dept. of Agromet., Argentine tl. Met. Serv.*), **El índice heliotérmico aplicado a los trigos Argentinos.** [Heliothermic index plied to Argentine wheat.] *Meteoros*, Buenos Aires, 4(3):129–157, July/Sept. **1954.** 8 figs., tables, 18 refs. Spanish and English summaries p. 129. **DWB**—Geslin's heliothermic lex, which is a synthesis of mean daily temperatures and mean length of day during the owth period, was applied to 37 varieties sown fortnightly from March to Oct. at the "Ob-vatorio Agrometeorologico Principal de Costelar" and at the Rafaela and Balcarce Agro-teorological stations during 1950, 1951, 1952 and 1953. The values of the heliothermic lex show the variations resulting from the changed dates of sowing during the same year l the variations of the date of sowing in different years at different locations. The various rieties of wheat are classified into four groups depending upon temperature and photo-riodic requirements of growth. *Subject Headings:* **1. Heliothermic index 2. Wheat phe-ology 3. Argentina.**—*I.L.D.*

6.11–347 551.586:612.014.4(82)

Brazol, Demetrio, **Bosquejo bioclimático de la República Argentina.** [Bioclimatic sketch Argentina.] *Meteoros*, Buenos Aires, 4(4):381–394, Oct./Dec. **1954.** 4 maps, 3 tables. anish and English summaries p. 381. **DWB**—The sketch of Argentine bioclimatic condi-ns which utilizes a 10 year record of climatic data for 103 stations, is based upon the "Scale Sensible Climate" which relates various scales of climatic comfort to specific values of dry b, wet bulb and equivalent temperature and enthalpy of the atmosphere. Fifty localities classified according to their bioclimatic characteristics and isotherms of climatic comfort a very hot, cold, cool and comfortable Argentina are constructed. *Subject Headings:* **Bioclimatology of Argentina 2. Comfort climate 3. Argentina.**—*I.L.D.*

UPPER AIR CLIMATOLOGY

6.11–348 551.587:551.577.32(52)

Matsumoto, S.; Itoo, H. and Arakawa, Akio, **An aerological study on the pre-summer rainy season in Japan.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 32(4):85–95, April **1954.** 12 figs., 18 refs. **MH-BH**—The amount of precipitation is examined in relation to the upper wind field and temperature field in the pre-summer rainy season (June and July) in Japan for the years 1950 and 1951. It may be explained as a result of vertical motions of baroclinic unstable waves in the westerlies. In the atmospheric structure during this season there can be found a similarity to the structure of baroclinic unstable wave. It is found from the data of 1946, 1950 and 1951 that the horizontal distribution of the mean zonal velocity also has some relations to the mechanism of precipitation, which suggests that a more complete, three-dimensional theory of baroclinic instability is needed. Some brief remarks are given on the relations between the basic flow and the disturbances. *Subject Headings:* **1. Aerological studies 2. Rainy seasons 3. Baroclinic instability 4. Japan.**—*Author's abstract.*

ENVIRONMENTAL INFLUENCES

See also: **Climate in relation to crops** (Thornthwaite, Mather), 6.11–83; **Local climatic influenses** (Grunov), 6.11–84; **Snow cover** (Chomicz), 6.11–306.

6.11–349 551.588.7

Polozova, L. G., **O kharakteristike kontinental'nosti klimata.** [Characteristics of the continentality of climate.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 86(5):412–422, Sept./Oct. **1954.** 5 figs., 3 refs., 6 eqs. **DLC**—The formulas of Zenker and Gorczyński expressing continentality and the work of I. I. Ivanov and A. A. Borisov on continentality are discussed critically. The author then analyzes the latitudinal variation of temperature during Jan. and July and shows that continentality must be measured separately for winter and summer since the circulation between land and sea shows seasonal differences. Continentality as expressed quantitatively with the aid of formulas developed by Shuleĭkin for expressing the flow of the heat field, arises in the interaction of land and sea in terms of temperature anomalies. *Subject Heading:* **1. Continentality.**—*I.L.D.*

MISCELLANEOUS

COSMIC INFLUENCES

See: **Review of IGY** (Bartels), 6.11–27; **Diurnal and seasonal wind variations** (Greenhow, Neufeld), 6.11–273; **Solar reflections on clouds** (Zamorskiĭ), 6.11–287.

VISIBILITY

See: **Ceiling and visibility statistics** (Uruguay. Serv. Met.), 6.11–70.

OPTICAL PHENOMENA

See also: **Optical Society of America, Philadelphia, Journal,** 6.11–51.

6.11–350 551.593.11(521.42)

Nakano, T., **Mirage in the Toyama Bay.** *Journal of Meteorological Research*, Tokyo, 6(1/3):67–70, March **1954.** 9 figs., table, 5 refs. In Japanese; English summary p. 67. **MH-BH**—The mirage in Toyama Bay in relation to meteorological conditions is investigated with the following results: 1) The frequency of occurrence is large in April, May and June and sometimes in the autumn months. It appears from 11 h to sunset, the maximum frequency being found at about 15 h. 2) It is likely to occur during a N–NE wind with the velocity less than 5 m, fine weather or overcast with high clouds, and water temperature about 6°C less than maximum air temperature. 3) It seems to occur when an anticyclone which has crossed Japan Proper reaches the sea off Sanriku in the daytime the upper air

1000 m in height) having high temperature with small pressure gradient. *Subject Headings:* **Mirages 2. Toyama Bay, Japan.**—*From author's abstract.*

6.11–351 551.593.12:551.557.3

Gifford, Frank, Jr. (*U. S. W. B.*), **The height of scintillation-producing disturbances.** *merican Meteorological Society, Bulletin*, 36(1):35–36, Jan. **1955.** fig., 5 refs. **MH-BH**—Vind speed is correlated with scintillation intensity up to elevations of at least 50,000 ft on ne basis of data obtained on 24 nights during 1953 in Washington. Cases showing the linear orrelation coefficient of scintillation intensity plotted against wind speed for scintillation tensities of 25 cps and 150 cps are presented. It is concluded that high frequency (150 cps) intillation is produced near the mean level of the tropopause and low frequency (25 cps) intillation is not markedly related to wind speed below 6,000 ft. *Subject Headings:* **1. Scintillation intensities 2. Wind speed-scintillation relationships.**—*I.L.D.*

6.11–352 551.593.51

Dietze, G., **Die Sichtbarkeit des "grünen Strahls." Farbmetrisch-physiologische etrachtung einer atmosphärisch-optischen Erscheinung.** [The visibility of the green ray: olorimetric-physiological consideration of a phenomenon of atmospheric optics.] *Zeitschrift ür Meteorologie*, 9(6):169–178, June **1955.** 5 figs., 6 tables, 10 refs. **MH-BH**—The last egment of the red sun at sunset, or the first at sunrise, often appears green ("green segment") ue to greater refraction with decreasing wave length. The red (610 mμ+) vanishes while % of radius seen by green (490–570 mμ) is still above horizon. Taking account of decrease f luminosity towards edge of sun, and transmission factor of earth's atmosphere, the spectral istribution with different visible radii is shown. The physiological factors are then considered nd the equivalent wave-length, saturation and strength of the setting sun for Rayleigh tmosphere and different turbidities tabulated. These are interpreted as the succession of olors seen by an observer with normal vision. At solstices the green color lasts for 1.6–1.8 ec, at equinoxes 1.2–1.4 sec. The effect of refraction in enlarging the visible segment is iscussed. *Subject Heading:* **1. Green flash.**—*C.E.P.B.*

6.11–353 551.593.51

Forthman, William H. (*Univ. of Calif., Los Angeles*), **The green flash.** *Navigation*, Los ngeles, 4(5):212–214, March **1955.** 3 refs. **DLC**—The green flash was observed 4000 ears ago (Egyptians depicted setting and rising sun as green), but not until 1869 was it ecorded again (by JOULE in the **Proceedings of the Manchester Literary and Philosophical ociety**). Explanations vary, though most acceptable one involves spectral refraction entering enser atmosphere of earth. Clear air, preferably over a sharp sea horizon, is ideal. Most eople have never observed it, though it is present very often in some places. It can be seen ith a telescope and even when sun goes below clouds, or when planets set. *Subject Heading:* **Green flash.**—*M.R.*

6.11–354 551.593.53:551.311.18

Möller, Fr., **Zur Erklärung des Eisblinks.** [Explanation of the ice blink.] *Polarrschung*, Kiel [Ser.] 3, 23(1/2):236, **1953.** Reprinted in *Wetterlotse*, No. 94/95:237–239, ov./Dec. **1955. DWB**—Author calculated that with sun 14° above horizon, sky 1° above orizon is three times as bright with albedo 70% (ice) as with albedo 10% (water). The olor is equivalent to saturation of 13% at 436 mμ over ice, 27% at 482 mμ, i.e., twice as blue, er sea. *Subject Heading:* **1. Ice blink.**—*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **America's state in world forestry** (U. S. Forest Serv.), 6.11–91; **Study of individual radio atmospheres** (Bowe), 6.11–106; **Interpretation of radio reflections from aurora** (Booker et al.), 6.11–107; **Beta ray ionization from ground** (Hess et al.), 6.11–131.

6.11–355 551.594.22

Malan, D. J. (*Bernard Price Inst. of Geoph., Johannesburg Univ.*), **Les décharges orageuses ntermittentes et continues de la colonne de charge négative.** [Intermittent and continuous

thunderstorm discharges of the negatively charged column.] *Annales de Géophysiqu* Paris, 10(4):271–281, Oct./Dec. **1954.** 4 figs., table, 12 refs. French and English summarie p. 271. **MH-BH**—Large final slow field changes most frequently occur after flashes havin fewer than four strokes. It is shown that these field changes are due to the continuous dis charge to ground of part of the negatively charged column higher than that reached by th last stroke. The mechanism of progress of the discharge up the column is similar to that of th interstroke process. The discharge to ground changes from intermittent to continuous whe the charge density in the column reaches an upper limit and stops when the density become too low. It is concluded that flashes having less than four strokes frequently reach −41° level by the subsequent continuous discharge process and that the negatively charged colum thus extends to the −41°C level in most, if not all, thundercloud cells on the point of dis charging. *Subject Headings:* **1. Lightning discharges 2. Lightning strokes.**—*Author' abstract.*

6.11–356 551.594.221:621.

Fritsch, Volker, **Gibt es "Blitznester"?** [Are there lightning "nests."] *Umschau* 55(15):452–454, Aug. 1, **1955.** 5 figs., 6 refs. **DLC**—Lightning first became important whe networks of conducting wire were built. Investigations in Saxon and Austrian networks ar described. Frequency of strokes depends more on specific resistance of rock formation tha on height; non-homogeneous zones, iron ore deposits, water-bearing strata, etc. are especiall liable to strokes. Laboratory investigations in Uppsala are described; negative discharge from a point were mainly and positive discharges almost entirely concentrated on a narro conducting strip embedded in sand. *Subject Heading:* **1. Lightning nests.**—*C.E.P.B.*

6.11–357 551.594.22

Karpov, A. N., **Dreĭfuiushchie razriady molnii.** [Drifting lightning discharges.] *Pr roda*, Moscow, 44(4):116–117, April **1955.** fig. **DLC**—Two photos of drifting lightnin discharges during a thunderstorm which occurred at about 2 a.m. of July 9, 1954 in the vicinit of Golotof Village, Saratov District, after a long rainless period, are presented. They wer made at a distance of 12 km from the storm cloud and show clearly the displacement of th successive impulses passing along the discharge channel which is displaced by the win Author adds that there was no rain, in spite of the heavy thunder. *Subject Headings:* **1. Drif ing lightning 2. Lightning discharges 3. Saratov Region, U.S.S.R.**—*A.M.P.*

6.11–358 551.594.5 551.521.

St. Amand, Pierre and Ashburn, E. V., **The frequency distribution of the intensity o aurorae and the night airglow for 5577 [OI].** *Journal of Geophysical Research*, 60(1):112 113, March **1955.** fig., 4 refs. **DWB**—Comparison of histograms of frequency of differen intensities of nightglow (4 years at Cactus Peak, Calif., and similar one for southern France and of aurora (College, Alaska) show marked difference in frequency of intensity ranges an in nature of distribution of the two phenomena. An estimate is attempted of the probabilit that an aurora as weak as the strongest nightglow or a nightglow as bright as the weakes aurora would occur in Southern California and incidentally whether or not they are the sam phenomenon. This probability is very remote in time of the order of thousands of yea though data may not be absolutely comparable. *Subject Headings:* **1. Auroral intensitie 2. Night airglow intensities 3. Cactus Peak, Calif. 4. College, Alaska.**—*M.R.*

6.11–359 551.594.51:535.338.

Meinel, A. B. (*Yerkes Observ., Williams Bay, Wisc.*), **Protons and the aurora.** *U. S. A Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:41–59, July **195** 6 figs., 21 refs. Discussion p. 53–58. **MH-BH**—The importance of the discovery by VEGAR of hydrogen Balmer emissions in some aurorae in 1939 was not fully realized for many year As a rule, the hydrogen alpha and hydrogen beta lines were not present in his spectra; onl occasionally did these emissions appear strongly. The opportunity to determine whethe the hydrogen lines showed any Doppler displacement occurred during the great aurorae 18–20 Aug. 1950. Spectra were obtained of the hydrogen alpha region with a high resolutio spectrograph pointed towards the magnetic zenith and towards the north magnetic horizo

Spectra of a quiet auroral arc at the magnetic horizon showed a strong, undisplaced, but broadened hydrogen alpha line. The line was completely symmetrical and unaffected by the adjacent, but relative weak first positive bands of molecular nitrogen. Spectra of another quiet arc passing through the magnetic zenith, on the other hand, showed a very asymmetrical hydrogen alpha profile. The violet wing of H_α was shifted 71 A, while the maximum was displaced 10 A. The asymmetrically displaced hydrogen alpha profile showed conclusively that high velocity protons were impinging on the high atmosphere and that they were being sharply decelerated in passing through it. The violet wing displacement corresponds to a velocity of 3300 km/sec, equivalent to an energy of 57 keV, which is considerably in excess of velocities for auroral particles as estimated by indirect means. On both nights the successive auroral stages consisted of the formation of a quiet arc phase. As soon as the arc broke up into rays, streamers, and pulsating surfaces, the hydrogen alpha line faded away. As to the penetration of auroral particles: electrons of the same energy as protons will penetrate farther, but electrons of the same velocity as protons will penetrate less. *Subject Headings:* **1. Auroral spectra 2. Balmer lines 3. Auroral hydrogen lines 4. Protons.**—*Author's abstract.*

6.11–360 551.594.6 621.396.821:621.396.812.3

Carbenay, Fernand, **Correspondance entre le niveau moyen des atmosphériques et le degré d'intellibilité d'une liaison radioélectrique sur onde kilométrique.** [Correlation between average amount of sferics and the degree of intelligibility of radioelectric communication at kilometer wavelength.] *Académie des Sciences, Paris, Comptes Rendus,* 235(6):423–425, Aug. 11, **1952.** fig., 5 refs., eq. **DWB**—Note on an experiment made at the Laboratoire National de Radioélectricité at Bagneux on June 26, 1952. The original record of frequency and intensity of atmospherics is reproduced and corresponding values of deficiency in reception are indicated. Thus, for example, defective reception was 3% with sferics having an average intensity of 7.5 microvolts per meter, and 15% with 33 microvolts per meter. *Subject Headings:* **. Sferics 2. Radio reception.**—*G.T.*

6.11–361 551.594.7:621.396.029.6:551.510.41

†Williams, Dudley, **Microwave frequency and atmospheric profiles.** Ohio State Univ. Research Foundation, Contract AF 19(122)-13, Final Report, **1954.** 6 p. List of 40 publications and public reports done under contract, p. 2–5. **DWB**—A list of 40 publications on microwave methods of gas analysis, resulting from this contract, is appended to a brief summary of past work in this field. Application to rocket and balloon soundings of high atmosphere did not give as good results as other techniques. Development and testing of selective infrared detectors for use in air-borne gas analyzers and the use of the latter in profile studies of CO_2, etc. in upper atmosphere also did not give too satisfactory results. *Subject Headings:* **1. Microwave absorption by gases 2. Absorption spectra 3. Air-borne infrared gas analyzers.**—*M.R.*

ACOUSTICAL PHENOMENA

6.11–362 551.596.1:551.578.46

Oura, Hirobumi, **Reflection of sound at snow surface.** *Snow and Ice* (*Seppyo*), Tokyo, 12(3):273–275, **1950.** table, diagr., eqs. In Japanese. **DWB**—The reflections of sound at the snow surface were observed with the method of standing wave. If the amplitude of incident wave is a, and that of reflected wave is b, then the maximum amplitude of standing wave is $a+b$, and the minimum is $a-b$. These values were measured with the carbon microphone and the Brown tube. From these values the rate of absorption $A=(a^2-b^2)/a^2$ were calculated. The results are shown in tables. From these results the following are known: 1) the rate of absorption A is considerably large; 2) the smaller the density, the larger the absorption; 3) for settled snow, the higher the frequency of sound, the larger the absorption; and 4) for settled snow, when the snow was warmed and wetted, the absorption increased. *Subject Headings:* **1. Sound absorption 2. Snow cover effects.**—*Author's abstract.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON COOLING POWER AND ITS MEASUREMENT

By: *Isadore L. Dordick*

INTRODUCTION

Cooling power is defined as the rate of heat loss of a heated thermometer or of a larger body. The heat loss depends upon the physical characteristics of the particular object, namely its radiation absorption, wind sensitivity and surface temperature, which are invariable, and upon atmospheric temperature and air movement. Cooling power as an integrated measure of air temperature and wind velocity can be regarded as a climatic index characterizing the heat acceptance of the environment; on the other hand, as the heat loss of a thermometer at a temperature of 36.5°C, the assumed temperature of the skin, cooling power can resemble approximately the rate of cooling of the human body, so that when correlated with subjective sensations of comfort it can serve as an index of comfort or of climatic tolerance. Finally cooling power, measured with a silvered katathermometer, can be used to determine wind velocities.

The principal instruments for measuring cooling power are the Hill katathermometer and the Davos frigorimeter. The behavior of these instruments is represented by equations in which cooling power is a function of dry air temperature and wind velocity in the case of dry cooling power, or of air temperature and humidity and wind velocity for wet cooling power. Corrections for radiation can be introduced into the equations. Both types of instruments express the cooling power in millical./cm²/sec.

This selective bibliography lists the more important and useful studies on the measurement of cooling power, its applications as a climatic index or as an index of comfort, and the instruments employed to measure it.

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1920

6K–1 551.586:612.5

Normand, Charles W. B., **The effect of high temperature, humidity, and wind on the human ody.** *Royal Meteorological Society, Quarterly Journal,* 46:1–14, Jan. **1920.** 6 figs., 5 refs., 8 eqs. **LC**—After a qualitative analysis of the problem of the effect of wind velocity in raising body mperature during a simoon, the author analyzes quantitatively the cooling of wet surfaces at ody temperature under varying atmospheric conditions in order to determine the upper limits for istence. Climatic limit is estimated with the aid of the dry and wet katathermometer and the et bulb formula. The results from wet kata and the wet bulb formula are compared and found be quite discordant. The advantages of the latter are discussed. The relationship between ie simoon and heat stroke is considered. This paper is followed by critical remarks from SIR EONARD HILL, etc. *Subject Headings:* **1. Dry and wet katathermometers 2. Body heat loss Climatic tolerance.**—*I.L.D.*

1923

6K–2 551.508.98 551.58:6

The kata-thermometer in studies of body heat and efficiency. *Medical Research Council Great Britain, Special Report Series* No. 73, **1923.** 196 p. **DLC**—This monograph presents both ie theory of the katathermometer and its application through the concept of cooling power in

assessing the environmental climate in industry. The papers constituting this monograph are as follows: The katathermometer as a physical instrument by MISS D. HARGOOD-ASH and LEONARD HILL; Comparison of katathermometer readings in temperate, Alpine and subtropical climates by LEONARD HILL; The use of the katathermometer in industry by H. M. VERNON; The effect of increasing or lessening the humidity of the air in a room by LEONARD HILL; The index of comfort at high atmospheric temperatures by H. M. VERNON; Observations on metabolism during rest and work with special reference to atmospheric cooling power by LEONARD HILL and J. ARGYLL CAMPBELL; A new recording katathermometer by E. H. J. SCHUSTER and Alterations in a laundry to improve the atmospheric conditions by MAY SMITH. *Subject Headings:* **1. Katathermometers 2. Industrial climatology 3. Physiological climatology 4. Comfort indexes.**—*I.L.D.*

1924

6K–3 551.508.98 551.586

McConnell, W. J. and Yaglou, C. P., **The kata-thermometer, its value and defects.** *U. S. Bureau of Mines, Reports of Investigations*, No. 2565, Jan. 1924. 12 p. 3 figs., ref. **DLC**—This critical paper on the value of the katathermometer as suitable instrument in studies of the effects of high temperature and humidity of air on comfort conditions of men working in mines contains the following: a brief account of the history and development of the katathermometer, a description of the instrument and of its use, a mathematical presentation of the physical principles of the kata-thermometer, the equations for the dry and wet katathermometer, the use of the katathermometer as an anemometer and the equations for determining wind velocity, a description of the electric kata type and the use of the katathermometer as an index of human comfort. *Subject Headings:* **1. Katathermometers 2. Physiological climatology 3. Cooling power data 4. Comfort indexes 5. Hill cooling power formulas.**—*I.L.D.*

1925

6K–4 551.586:612

Brooks, Charles F., **The cooling of man under various weather conditions.** *Monthly Weather Review*, 53(10):423–424, 1925. ref. **DWB**—Data on the rate at which man cools under various weather conditions compiled by LEONARD HILL in **The Science of Ventilation and Open Air Treatment** has been reduced by the author to mathematical formulas "in an effort to find a basis by which weather might be classified according to its relation to human comfort." Formulas expressing the calorimetric observations by LEFEVRE on human cooling, and the data on human comfort obtained with katathermometer observations are presented. *Subject Headings:* **1. Katathermometers 2. Comfort indexes 3. Hill cooling power formulas.**—*I.L.D.*

6K–5 551.586:612.014.4

Donnely, E. C., **Human comfort as a basis for classifying weather.** *Monthly Weather Review*, 53(10):425–426, 1925. 2 figs., table. **DWB**—Weather is classified according to its relationship to human comfort with the aid of cooling power as measured by means of the katathermometer. The formulas used are as follows: for temperatures below 70°F

$$C_m = \left(\frac{19.5-\theta_1}{663}+\frac{3.0+\theta_1}{222}\sqrt{v}\right)\left(0.10+\frac{0.v0}{\sqrt{v}}\right)0_1+0.35-(2.0\times S),$$

for temperatures above 70°F

$$C_m = (0.13+0.47\sqrt{v})\theta_1\frac{(8.5-\sqrt{v})}{11.8\times 10}+0.35+(2.0\times S)$$

Cooling power (C_m) in millicalories per sq cm per second for dry man at rest in the shade for Los Angeles is given in a table and in a graph. *Subject Headings:* **1. Body heat loss 2. Physiological climatology 3. Comfort indexes 4. Dry katathermometer formulas 5. Los Angeles, Calif.**—*I.L.D.*

6K–6 551.508.98

Thilenius, R. and Dorno, Carl W. H., **Das Davoser Frigorimeter. Ein Instrument zur Dauerregistrierung der physiologischen Abkühlungsgrösse.** [The Davos frigorimeter, an instrument for the continuous recording of physiological cooling power rates.] *Meteorologische Zeitschrift* 42(2):57–60, 1925. **DWB**—The shortcomings inherent in the Hill katathermometer are listed. The Davos frigorimeter which is free of these defects is described in detail. *Subject Headings:* **1. Katathermometers 2. Davos frigorimeter.**—*I.L.D.*

1926

6K–7 551.586:612.014.4 551.508.98

Dorno, Carl W. H., **Papers on the relation of the atmosphere to human comfort.** *Monthly Weather Review*, 54(2):39–43, 1926. 2 figs., 9 refs. **DWB**—The value of the cooling power concept

calculating heat exchange between the human body and the surrounding atmosphere and its plication to determining human comfort are considered. The katathermometer and the Davos gorimeter (illustrated by means of a photograph) are described. *Subject Headings:* **1. Kata-ermometers 2. Davos frigorimeter 3. Body heat loss 4. Comfort indexes.**—*I.L.D.*

6K–8 551.508.98

Vernon, H. M., **Calibration of the kata-thermometer.** (In: Vernon, H. M., et al., **Methods of vestigating ventilation and its effects.** London, Medical Research Council, **1926.** p. 19–30. figs., 4 tables, 7 refs.) **DLC**—The author discusses the significance and determination of the efficient or factor of the katathermometer, the effect of temperature on the air-velocity relationship, e calculation of the air-velocity at various temperatures, the response of the katathermometer d the hot wire anemometer to vertical air currents and the inertia of the katathermometer. Pt. **I, The influence of cooling power and of variability of air currents on sensations of air movement.** 31–71. 8 figs., 10 tables, 5 refs. This section contains a discussion of the relationship between oling power and sensation of comfort, the relationship between cooling power and sensations of movement, seasonal variation of cooling power in relation to sensation of air movement as a anifestation of acclimatization, the effect of variable air currents upon the sensations of air move-ent, the effect of ventilation on the magnitude and variability of air currents and an account of oratory experiments on fan ventilation. *Subject Headings:* **1. Katathermometers 2. Comfort dexes 3. Body heat loss 4. Physiological climatology.**—*I.L.D.*

6K–9 551.586:612.014.4 551.508.98

Vernon, H. M., **Is effective temperature or cooling power the better index of comfort.** *Journal Industrial Hygiene*, N. Y., 8(9):302–401, **1926.** tables, 7 refs. **DLC**—The value of effective mperature and of cooling power as measured by the katathermometer is analyzed. The superiority the dry kata over effective temperature is stressed since the former takes into account acclimatiza-n. The correlation between cooling power and sensations of air movement, the value of wet bulb ermometer and of the wet katathermometer as an index of comfort for working individuals at gh atmospheric temperatures are discussed. *Subject Headings:* **1. Katathermometers 2. Effective mperature 3. Comfort indexes.**—*I.L.D.*

6K–10 551.586:551.524:551.508.98

Yaglou, C. P., **Effective temperature versus kata-thermometer: A reply to H. M. Vernon.** *urnal of Industrial Hygiene*, 8(9):402–413, **1926.** 4 tables, 9 refs. **DLC**—The author attempts show that the discrepancy between effective temperature and katathermometer as indices of mfort is due entirely to inherent defects in the latter and discusses the practical significance the effective temperature index and comfort zone, the relationship between acclimatization d comfort zone and comfort line, discrepancies between effective temperature and katather-ometer and the significance of wet bulb temperature. *Subject Headings:* **1. Katathermometers Effective temperature indexes 3. Comfort indexes 4. Acclimatization.**—*I.L.D.*

1927

6K–11 551.586:612 551.508.98

Dorno, Carl, **Grundzüge des Klimas von Muottas-Muraigl, Oberengadin. Eine meteoro-gische-physikalische-physiologische Studie.** [Foundations of the climate of Muottas-Muraigl. meteorological-physical-physiological study.] Braunschweig, Friedr. Vieweg & Sohn, **1927.** 7 p. **DLC**—The section on cooling power, p. 139–156, contains a discussion of cooling power and oling power data for various parts of the human body obtained with a Hill katathermometer, a cussion of the physiological significance of cooling power and data on mean maximum and mini-um cooling power of a dry and wet body measured at Muottas-Muraigl on given days, a critique the Hill katathermometer and a description of the Davos frigorimeter. *Subject Headings:* **1. Kata-ermometers 2. Davos frigorimeter 3. Physiological climatology 4. Body heat loss 5. Cooling wer data 6. Muottas Muraigl, Switzerland.**—*I.L.D.*

1928

6K–12 551.586

Campbell, J. Argyll and Angus, J. C., **Physiologic reactions of resting subjects to cooling wer and effective temperature.** *Journal of Industrial Hygiene*, 10(10):331–349, **1928.** 8 figs., tables, 12 refs. **DLC**—Pulse rate, skin temperature, perspiration, metabolism and heat loss were vestigated in naked and clothed resting male subjects exposed to dry bulb temperatures ranging m 20°C to 31°C with still and moving air and with relatively dry and moist atmospheres. It s found that the dry katathermometer cooling power is as good an indicator of physiological actions to atmospheric conditions as is effective temperature. *Subject Headings:* **1. Physiological matology 2. Cooling power 3. Effective temperature.**—*I.L.D.*

6K–13 551.586:612:551.508.9

Dorno, C., **Die Abkühlungsgrösse in verschiedenen Klimaten nach Dauerregistrierunge mittels des Davoser Frigorimeter.** [Cooling power rate in different climates on the basis of cor tinuous recording with a Davos frigorimeter.] *Meteorologische Zeitschrift*, 45(11):401–421, 1928 2 figs., 6 tables. **DWB**—Measurements of cooling power by means of the Davos frigorimeter unde room and outdoor conditions are discussed and the relationship between cooling power values o the one hand and air movement, radiation and precipitation on the other is considered. Coolin power was measured at Lugano, Agra, Davos, Zurich, Karlsruhe, Schreiberhan, Swinemünde Rio de Janeiro, Gällivare and Muottas-Muraigl and the mean monthly day, night and 24 hr value of cooling power, the monthly maxima and minima of daily and 24 hr values of cooling power an frequencies of monthly day, night and 24 hr cooling power values during the four seasons and frequenc of interdiurnal variations greater than 5 millical/cm²/sec are given in tables for each locality. Th measurements were made over periods of one to two years. The cooling power regime in each localit is analyzed in relation to climatic and weather conditions. The physiological significance of coolin power is discussed. *Subject Headings:* **1. Davos frigorimeter 2. Physiological climatology 3. En vironmental effects on cooling power 4. Cooling power data 5. Switzerland 6. Karlsruhe Germany 7. Swinemünde, Germany 8. Rio de Janeiro, Brazil 9. Gällivare, Sweden.**—*I.L.D.*

6K–14 551.508.98 551.58:

Hill, Leonard; Angus, T. C. and Newbold, E. M., **Further experimental observations to de termine the relation between kata cooling powers and atmospheric conditions.** *Journal of Industria Hygiene*, 10(10):391–407, 1928. 9 figs., 7 refs. **DLC**—In order to enable mining engineers an others to use the katathermometer as an anemometer and as a means of determining suitable condi tions of ventilation for workers in warm and humid air, the authors have studied the behavior of th katathermometer in wind tunnels with controlled temperature, humidity and air movement. Th wind tunnel and the control of the meteorological variables are described. Nomograms connectin dry kata readings, dry bulb temperature, air velocity and wet kata humidity and air movemen together with the equations from which the nomograms are constituted are presented. Effect o the atmospheric variables upon dry and wet kata and the accuracy of the dry and wet kata as foun from equations is analyzed. *Subject Headings:* **1. Dry and wet katathermometers 2. Industria climatology 3. Anemometers 4. Environmental effects on cooling power.**—*I.L.D.*

1929

6K–15 551.586:61

Conrad, V., **Messung und Berechnung der Abkühlungsgrössen.** [Measurement and calculatio of cooling power.] *Beiträge zur Geophysik*, Leipzig, 21(2/3):183–189, 1929. fig., tables. **DLC**— During the period Jan.–April cooling power (H) was measured with a Hill katathermometer a Salzburg. This directly observed cooling power was compared with that (h) calculated by Hill' formula from simultaneous measurements of air temperature and wind velocity. The values ob tained do not correspond. The quotient H/h is only slightly influenced by air temperature and i functionally related to wind velocity. The cooling power can be calculated from wind velocity an air temperature in millical/cm² for $v>1m/s$ by correcting Hill's formula with the expressio $H/h\sqrt[8]{v}=1.01$. *Subject Headings:* **1. Katathermometers 2. Calculated cooling power 3. Hi cooling power formulas 4. Salzburg, Austria.**—*I.L.D.*

1930

6K–16 551.508.9

Angus, T. P.; Hill, Leonard and Soper, H. E., **A new kata-thermometer for hot atmosphere and a simplified method for computing.** *Journal of Industrial Hygiene*, 12(2):66–73, 1930. fig 3 tables, 4 refs. **DLC**—A description of a modified katathermometer capable of investigatin ventilation in hot enclosures where the air temperatures are 125° and 130°F instead of 95° and 100°F The new instrument has a mean temperature 30°F higher than that of the old one so that th difference between the bulb and the ambient air is greater by this amount so that the time of coolin is considerably less. A nomogram for the high temperature kata is presented and its application i discussed. *Subject Heading:* **1. High temperature katathermometers.**—*I.L.D.*

6K–17 551.586:612:551.506(62

Lahmeyer, F., **Die Abkühlungsgrösse Assuans nach Dauerregistrierungen mittels der Davose Frigorimeters.** [The cooling power of Aswân based upon continuous recording with the Davo frigorimeter.] *Meteorologische Zeitschrift*, 47(1):27–28, 1930. tables. **DLC**—Data are presente on the mean monthly day, night, 24-hr, daily maximum and minimum cooling power values durin Jan.–March 1929, and frequencies of the day, night and 24-hr cooling power values during the sam

eriod for Aswân. *Subject Headings:* **1. Cooling power data 2. Davos frigorimeter 3. Aswân, Egypt.**—*I.L.D.*

1931

6K–18 551.586:612:551.506(494)

***Bider, Max, Ergebnisse der Beobachtungen mit dem Davoser Frigorimeter in Basel.** [Results of observations with the Davos frigorimeter in Basel.] *Strahlungstherapie*, Berlin, 39:541–564, 1931. 3 figs., 7 tables. **DSG**—In this study the author analyzes the influence of air temperature, wind, precipitation, and radiation upon cooling power values recorded at Basel with a Davos frigorimeter. The values of cooling power recorded at Basel at several stations during the period 1928–1930 are presented in the form of mean monthly, day, night and 24-hr values and daily and 24-hr extreme values, and as mean seasonal values. Frequencies of day, night and 24-hr values are presented for each season. *Subject Headings:* **1. Cooling power data 2. Davos frigorimeter 3. Environmental effects on cooling power 4. Basel, Switzerland.**—*I.L.D.*

6K–19 551.508.98

Goldschmidt, H., **Eine einfache Registervorrichtung für das Davoser Frigorimeter.** [A simple recording device for the Davos frigorimeter.] *Meteorologische Zeitschrift*, 48(11):435–437, 1931. diagr. **DLC**—The structure of a recording device constructed specially for the Davos frigorimeter is described with the aid of a diagram. A contact pen is attached to the large hand of the frigorimeter clock which is connected electrically with the clock case and which touches after every five minutes of heating. One of the 12 contact knobs is attached to the edge of the face of the frigorimeter clock. *Subject Heading:* **1. Davos frigorigraph.**—*I.L.D.*

6K–20 551.586:612:551.506(471.1)

***Lunelund, Harald, Frigorimetrische Untersuchungen in Helsingfors, Finnland.** [Frigorimetric investigations in Helsingfors, Finland.] *Strahlungstherapie*, 39:565–580, 1931. 3 figs., 13 tables, ref. **DSG**—The author analyzes the first frigorimetric measurements of cooling power begun in Finland in 1926 and continued to 1930. The measurement set-up is described, and tables giving mean monthly cooling power values for fixed hours, monthly means, dependence of mean daily cooling power upon temperature, wind velocity and cloud cover, cooling power values in the shade, and in partial shade, under calm conditions and in protected positions, comparison of measured cooling power with that calculated by means of Dorno formula, preliminary normals of cooling power for open position, calm and protected position, etc. are presented. *Subject Headings:* **1. Dorno cooling power formulas 2. Cooling power data 3. Helsinki, Finland.**—*I.L.D.*

6K–21 551.586:615.8

Pfleiderer, H., **Die Abkühlungsgrösse, ihre heilklimatische Bedeutung und ihre Messmethode.** [Cooling power: its therapeutic importance and its measurement.] *Strahlungstherapie*, 40:562–575, 1931. 4 figs., 15 refs. **DSG**—The author reviews briefly the different physical methods for measuring cooling power and discusses the physiological value of the cooling power measurement, the difficulties in its application, shows the advantages of the Pfleiderer-Büttner frigorigraph and counters the various objections made against the value of cooling power. *Subject Headings:* **1. Medical climatology 2. Pfleiderer-Büttner frigorigraph.**—*I.L.D.*

6K–22 551.586:612.5

Schultze, Walther, **Temperaturmessungen im Innern der Haut und deren Beziehung zur Abkühlungsgrösse.** [Temperature measurements in the interior of the skin and their relation to cooling power values.] *Strahlungstherapie*, 39:303–319, 1931. 7 figs., ref. **DSG**—The relationship between internal skin temperature and cooling power (measured with the Davos frigorigraph) is examined on the basis of 45 cooling power measurements made on cold, moderate and warm days. Curves show a parallel course for internal skin temperature and cooling power. *Subject Headings:* **1. Frigorigraphs 2. Internal skin temperature 3. Body heat loss.**—*I.L.D.*

6K–23 551.508.98

Thilenius, Rud, **Die Konstruktion der Davoner Frigorimeters.** [Construction of the Davos frigorimeter.] *Meteorologische Zeitschrift*, 48(7):254–260, 1931. illus., diagr., ref. **DLC**—The author describes the measurement principle of the Davos frigorimeter, the structure of the various parts of the instrument, including the temperature, relay and heating circuits, method of observation and installation of the instrument. Both a photograph of the instrument and its circuit diagram are shown. *Subject Heading:* **1. Davos frigorimeter.**—*I.L.D.*

6K–24 551.508.98 551.586:612.551.506(494)

***Tichy, Hans, Beitrag zur Wertung des Schreiberhaner Klimas auf Grund von Beobachtungen mit dem Davoser Frigorimeter.** [Contribution to the evaluation of the Schreiberhan climate on

the basis of observations with the Davos frigorimeter.] *Strahlungstherapie*, 39:581–586, **1931.** 2 tables, 14 refs. **DSG**—The medical value of the cooling power concept is discussed and tables giving the frequency of cooling power values for the work day (7–19 o'clock) for each month evaluated on the basis of 22 months (1927/28–1930) of measurements with the Davos frigorimeter. A table giving the distribution of interdiurnal variation of cooling power for each month is given. *Subject Headings:* **1. Davos frigorimeter 2. Physiological climatology 3. Cooling power data 4. Schreiberhan, Switzerland.**—*I.L.D.*

6K–25 551.586:612:551.506(43)

*Voigts, Heinrich, **Beobachtungen über Strahlung und Abkühlungsgrösse in Travemünde.** [Remarks on radiation and cooling power in Travemünde.] *Zeitschrift für angewandte Meteorologie*, 48(4):115–126, **1931.** fig., 6 tables. **DWB**—Measurements of cooling power were carried out with a Hill katathermometer in Travemünde during July–Dec. 1930. Data are presented on the monthly maximum, minimum and mean values of the dry and wet cooling power. In addition data on the calculated monthly mean minimum and maximum for morning and afternoon, calculated annual variation of cooling power, frequency distribution of the calculated cooling power value, diurnal variation of cooling power and calculated cooling power values by means of the frigorimeter equations are given. *Subject Headings:* **1. Cooling power data 2. Calculated cooling power 3. Travemünde, Germany.**—*I.L.D.*

1932

6K–26 551.586:612:551.506(62)

Lahmeyer, F. and Dorno, C., **Assuan. Eine meteorologisch-physikalisch-physiologische Studie.** [Aswân: a meteorological-physical-physiological study.] Braunschweig, Friedr. Vieweg & Sohn, **1932.** 68 p. **DLC**—Cooling power was measured thrice daily during Jan., Feb., March, Dec. 1928/29, 1929/30 and 1930/31 with a Davos frigorimeter. Data are presented: monthly mean of the daily variation of cooling power (in sun), percent frequencies of monthly day, night and 24 hour values of cooling power and daily variation of mean monthly cooling power in the shade; all cooling power values are in millicalories/cm²/sec. *Subject Headings:* **1. Davos frigorimeter 2. Cooling power data 3. Environmental effects on cooling power 4. Aswân, Egypt.**—*I.L.D.*

6K–27 551.586:612:551.506(43)

*Reiner, H., **Messungen der Abkühlungsgrösse in Swinemünde.** [Measurements of cooling power in Swinemünde.] *Meteorologische Zeitschrift*, 49(3):105–112, **1932.** 6 tables, ref. **DWB**—Cooling power data obtained with a frigorimeter at Swinemünde during Jan. 1930–Feb. 1931 are analyzed. Data are presented on the mean monthly cooling power for night time, forenoon and afternoon, and for 24 hrs, monthly frequencies of cooling power for the same time intervals, monthly number of changes of cooling power by 5 millical/cm²/sec and dependency of cooling power upon wind velocity by season. Also an analysis of the relationship between weather and cooling power is presented for a specific time interval. *Subject Headings:* **1. Cooling power data 2. Davos frigorimeter 3. Swinemünde, Germany.**—*I.L.D.*

6K–28 551.586:612

Robitzsch, M., **Der Ventilationsfaktor.** [The ventilation factor.] *Beiträge zur Geophysik*, 36(1):133–144, **1932.** fig., eqs. **DLC**—On the basis of aerodynamic considerations, the coefficient of external heat conductivity law of cooling is replaced by the value $c_p \frac{dm}{dt}$ in which $\frac{dm}{dt}$ is defined as the "ventilation factor" which is determined both by the structure of the ventilation current and the surface characteristic and form of the cooling body. The derived equation

$$\frac{dw}{dt} = \frac{dm}{dt} c_p \left[\left(T_0 + \frac{1570}{B} c_0\right) - \left(T_1 + \frac{1570}{B} c_1\right)\right]$$

(T_0 = temperature of the skin surface, c_0 = vapor pressure directly above the skin surface, T_1 = temperature of the free air, c_1 = vapor pressure of free air, B = barometric reading, dw/dt = heat loss by body per unit surface and unit time, dm/dt = ventilation factor). The determination of dm/dt by observation of the temperature fall of a dry warm body, by the method of alternating temperature differences of measuring devices and by the aid of evaporation measurements is described. *Subject Headings:* **1. Physics of cooling 2. Dry and wet cooling power measurement.**—*I.L.D.*

6K–29 551.586:612:551.506(433)

*†Schmid, G., **Die Abkühlungsgrösse auf der Zugspitze.** [Cooling power on the Zugspitze.] *Bavaria. Landeswetterwarte, Deutsches Meteorologisches Jahrbuch*, **1932.** p. c1–c42. 38 tables, 29 figs., 33 refs. **DWB, DLC**—This study is concerned with the temporal variation of cooling power and its dependence upon the individual meteorological variables and is based upon measurements

made over a period of one year at the Zugspitze Observatory. Cooling power was measured with the Hill katathermometer. The physical principles of the katathermometer and the measurement procedure are described. The dependence of the dry and wet katathermometer upon air temperature, wind velocity, radiation, including nocturnal radiation, direct solar radiation, diffuse radiation, cloudiness, precipitation (rain and snow), also the method of reducing wind velocity at the station anemometer to the velocity at the measuring point is presented. The daily means of the dry and wet cooling power values are presented in a table and the daily annual and seasonal variation, daily amplitude of cooling power and its relationship to wind direction are analyzed and the translation of cooling power values into subjective sensations in considered. *Subject Headings:* **1. Cooling power data 2. Comfort indexes 3. Zugspitze, Germany.**—*I.L.D.*

6K–30 551.586:612

Vernon, H. M., **The determination of a single index of atmospheric conditions in relation to physiologic effects.** *Journal of Industrial Hygiene*, 14(9):328–338, 1932. 4 figs., 5 tables, 15 refs. **DLC**—A study of the reactions of pulse rate, skin temperature, insensible perspiration and metabolism of individuals exposed to dry bulb temperature at 20°, 25°, 30° and 35°C with still and moving air and with relatively dry and moist atmospheres. The relative value of katathermometer and effective temperature as an indicator of physiological reactions to atmospheric conditions was examined and the advantages of the former are considered. *Subject Headings:* **1. Katathermometers 2. Physiological climatology.**—*I.L.D.*

1933

6K–31 551.508.98 551.586:612.5

Bedford, T. and Warner, C. G., **The influence of radiant heat and air movement on the cooling of the kata-thermometer.** *Journal of Hygiene*, 33(3):330–348, Aug. 1933. 5 figs., 8 tables, 10 refs., 23 eqs. **DLC**—The authors attempt to describe more accurately the effects of radiation on the cooling power of the katathermometer. Included in this study are the determination of the katafactor in still air chamber from the empirical formula of O. W. GRIFFITH and by direct calorimetric calculations for the body temperature, katathermometer, heat loss by radiation and convection, observations on the silvered body katathermometer, and on the high-temperature katathermometer, and an analysis of the behavior of the katathermometer in moving air containing a description of the relation between heat loss and air velocity, the influence of temperature on the determination of velocity, observation on the standard and silvered body temperature katathermometer and of the high temperature katathermometer in moving air. A general equation for the body temperature kata and the high temperature kata is presented and the measurement of radiant heat is considered. *Subject Headings:* **1. Griffith katathermometer formula 2. Silvered katathermometers 3. Body heat loss 4. High temperature katathermometers.**—*I.L.D.*

6K–32 551.586:612.5

Büttner, K., **Kritisches über Abkühlungs- und Austrocknungsgrösse.** [Critical remarks on cooling and desiccation rates.] *Meteorologische Zeitschrift*, 50(4):126–130, April **1933.** 18 refs., 14 eqs. Also: Findeisen, W., **Bemerkungen zur Arbeit von K. Büttner. . . .** [Remarks on the work of K. Büttner. . . .] *Ibid.*, 50(8):313–314, Aug. **1933.** Also: Büttner, K., **Erwiderung auf die Bemerkungen von W. Findeisen. . . .** [Reply to the remarks of W. Findeisen. . . .] *Ibid.*, 50(9):340, Sept. **1933. DWB**—The author presents a mathematical treatment of the physical properties of the boundary layer surrounding every object in still or moving air, heat transfer under wind conditions including a comparison of various heat transfer numbers, heat transfer in still air, the dependence of cooling power upon the atmospheric pressure and temperature, radiation number of the frigorimeter and of the human body, meteorological use of the frigorimeter and evaporation-desiccation value. FINDEISEN disagrees with the assertion of BÜTTNER that the change of temperature, of water vapor content and of flow velocity proceeds linearly in the boundary layer. He maintains also that the equation $Q = \lambda \cdot \text{grad}\ \vartheta$ given by BÜTTNER for determining heat loss from a body holds only when "grad ϑ" temperature gradient in the immediate surrounding of the body is known, that the equation $\delta = d/\sqrt{R}$ expressing the thickness of the boundary layer is not conceivably valid, etc. In BÜTTNER's reply the objections raised by FINDEISEN are answered on the basis of experimental evidence, a manifestation of Prandtl's theory in regard to the thickness of the boundary layer, etc. *Subject Headings:* **1. Physics of cooling 2. Body heat loss 3. Environmental effects on cooling power 4. Davos frigorimeter.**—*I.L.D.*

6K–33 551.586:612:551.506(43)

*Goldschmidt, Hans, **Messungen mit dem Davoser Frigorimeter in Wahnsdorf.** [Measurements with the Davos frigorimeter in Wahnsdorf.] *Meteorologische Zeitschrift*, 50(4):121–126, April **1933.** 2 figs., 3 tables, 11 refs. **DWB**—The author presents an analysis of cooling power data obtained with a Davos frigorimeter, provided with a contact thermometer adjusted to 36.5°C

over the period Dec. 1930–May 1932. Data showing the daily variation of cooling power (millical/cm²/sec) in monthly means, daily variations of wind velocity (m/sec) and of atmospheric temperature for the four annual seasons and the mean monthly, maximum and minimum values of cooling power for each month of the time interval are given in tables. The climatic and bioclimatic significance of the calculated cooling power values is discussed. *Subject Headings:* **1. Cooling power data 2. Microclimatology 3. Davos frigorimeter 4. Wahnsdorf, Germany**—*I.L.D.*

6K–34 551.586:612

Grimm, H., **Die Abkühlungsgrösse auf der Ostsee.** [Cooling power on the Baltic Sea.] *Zeitschrift für angewandte Meteorologie*, 50(1):25–27, **1933.** table, 3 refs. **DWB**—The author presents a table containing 33 measurements of wet cooling power made with a Hill katathermometer during June–July 1931 in the course of a trip on the Baltic Sea from Stettin to Vipuri. *Subject Headings:* **1. Katathermometers 2. Cooling power 3. Baltic Sea.**—*I.L.D.*

6K–35 551.586:612:551.501.6

Schultze, W. M. H., **Graphische Ermittlung von Abkühlungsgrösse und Hauttemperatur aus den meteorologischen Elementen.** [Graphical calculation of cooling power and skin temperature from the meteorological elements.] *Meteorologische Zeitschrift*, 50(2):56–59, **1933.** 3 diagrs., 8 refs., 5 eqs. **DWB**—After discussing the dry and wet cooling power equations developed by DORNO and THILENIUS in connection with the Davos frigorimeter and the Vincent formulas for determining skin temperature, the author presents nomograms for calculating quickly the above values. *Subject Headings:* **1. Davos frigorimeter 2. Dry and wet cooling power measurement.** —*I.L.D.*

6K–36 551.586:612:551.506(43)

*Wellenstein, Robert, **Beobachtungen am Schneeferner der Zugspitze.** [Observation at the Schneeferner of the Zugspitze.] *Strahlungstherapie*, 47:562–594, **1933.** 15 figs., 17 tables, refs. **DSG**—This study of the meteorological variables carried out at Schneeferner Haus contains a section on cooling power. Dry cooling power was measured during the period June 18–July 15, 1933 with a dry bulb katathermometer and cooling power values for 9, 13 and 19 o'clock; extreme values and also values calculated by L. HILL's formula are presented. *Subject Headings:* **1. Cooling power data 2. Dry katathermometers 3. Calculated cooling power 4. Zugspitze, Germany.** —*I.L.D.*

1934

6K–37 551.586:612:551.506(546)

*Dorno, C., **Das Klima von Agra, Tessin. Eine dritte und letzte meteorologisch-physikalisch-physiologische Studie.** [The climate of Agra: a third and final meteorological-physical-physiological study.] Braunschweig, Friedr. Vieweg & Sohn, **1934.** 56 p. tables. **DLC**—The author describes both the Hill katathermometer and the Davos frigorimeter and discusses the results of cooling measurements. Monthly means of dry cooling power and monthly means, maxima and minima of wet cooling power for 1923–1924 as expressed in the frigorimeter scale millical/cm²/sec are presented in tables. (For earlier studies, *see* 6K-11 and 6K-26.) *Subject Headings:* **1. Katathermometers 2. Davos frigorimeter 3. Dry cooling power 4. Agra, Switzerland.**—*I.L.D.*

6K–38 551.586:612.5

*Siegenthaler, J., **Ein Beitrag zur Frage der abkühlender Wirkung des Windes bei Bekleidung.** [A contribution to the problem of cooling action of the wind in the case of clothed bodies.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 1:25–28, **1934.** fig., 4 tables. **DWB**—Cooling power of Hill katathermometer and Davos frigorimeter are compared with the aid of the concept of "virtual cooling temperature," that temperature of still air produces the same cooling power as that produced by wind at higher temperature. Cooling power values depend upon size of the measuring body and also upon whether the latter is clothed or unclothed. A cylindrical device for measuring the dependence of heat loss per cm² upon the surrounding temperature and wind velocity is described and the cooling power values associated with various amounts of clothing layers and obtained with a Hill katathermometer and Dorno frigorimeter are analyzed. An empirical equation expressing the relationship between cooling power and clothing cover is presented. "Virtual cooling power" is calculated according to this formula and the physical mechanisms involved in the cooling under various degrees of clothing cover are discussed. *Subject Headings:* **1. Katathermometers 2. Davos frigorimeter 3. Cooling power data 4. Body heat loss.**—*I.L.D.*

6K–39 551.508.98:551.586

Vernon, H. M., **The principles of heating and ventilation.** London, Edward Arnold & Co., **1934.** 232 p. 52 figs., refs. **DLC**—The work contains an account of the method of using the

katathermometer to measure cooling power and for calculating air velocity, the relationship between sensations of air movement and of comfort to cooling power and temperature, a discussion of the use of the wet katathermometer, and application of cooling power as a climatic index in schools, factories and mines. *Subject Headings:* **1. Katathermometers 2. Physiological climatology.**—*I.L.D.*

1935

6K–40 551.586:612.014.4:551.588.3

*Büttner, K. and Sutter, E., **Die Abkühlungsgrösse in den Dünen. Rückstrahlung verschiedener Bodendeckungen für ultraviolette und gesamte Sonnenstrahlung. Ergebnisse einer Studienreise nach Satteldüne-Amrum.** [Cooling power in dunes. Back radiation of different soil covers for ultraviolet and total solar radiation. Results of a study trip to Satteldüne-Amrum.] *Strahlungstherapie*, 54:156–173, **1935.** 4 figs., 4 tables, 18 refs. **DSG**—The physiological cooling power of the dunes and its dependence upon local factors, in particular counterradiation was investigated at the edge and within the Amrum dunes. Measurements were made with a Pfleiderer-Büttner frigorigraph. In addition to dry bulb air temperature, relative humidity, global radiation and wind velocity were measured simultaneously. Tables give frequency of cooling power for the various localities at which measurements were made and for different weather conditions. Cooling power is evaluated in terms of sensation scale for nude and lightly clothed individuals. The role of counterradiation from the sand in determining cooling power is analyzed. *Subject Headings:* **1. Comfort indexes 2. Pfleiderer-Büttner frigorigraph 3. Environmental effects on cooling power 4. Satteldüne-Amrum, Germany.**—*I.L.D.*

6K–41 551.586:612:551.506(42)

Gold, E., **The effect of wind temperature, humidity and sunshine on the loss of heat of a body at temperature 98°F.** *Royal Meteorological Society, Quarterly Journal*, 62:316–331, **1935. Discussion.** 62: 331–342. **DWB**—On the basis of Hill's formulas for the cooling power of the katathermometer, diagrams are given showing isopleths of the cooling power of the air in millical/cm²/sec for winds up to 30 mph and for temperatures from 0° to 90°F for (1) a "dry" body at 98°F, (2) a "wet" body at 98°F for dry and for saturated air and (3) a "wet" body at 98°F for wet bulb temperatures from 0° to 90°F. The effect of radiation in a closed room and in the open air and of solar radiation upon cooling power is discussed. The interpretation of cooling power values in terms of subjective sensations of various degrees of comfort and its evaluation in terms of meteorological elements are proposed and illustrated in tables. By means of the isopleth diagrams, the cooling power of the air at Croydon was computed from the recorded wind, and wet bulb temperature for each day of the year 1934 and frequency tables of days of various degrees of cooling power were constructed. The discussion contains critical comments on the method and concepts employed by the author. *Subject Headings:* **1. Cooling power data 2. Katathermometers 3. Hill cooling power formulas 4. Comfort indexes 5. Environmental effects on cooling power 6. Croydon, England.**—*I.L.D.*

6K–42 551.501.6:551.586

Gradstein, S., **Nomogramme für die Abkühlungs- und Austrocknungsgrösse.** [Nomograms for cooling and desiccation rates.] *Meteorologische Zeitschrift*, 52(9):340–352, Sept. **1935.** 3 illus., 2 tables. **DWB**—The author presents nomograms for calculating dry cooling power, wet cooling power and desiccation magnitude. They are based upon formulas contained in **Das Klima von Agra** by C. Dorno. (*Same item as* 2D–114, Feb. 1951, *MAB; see* 6K–37.) *Subject Headings:* **1. Dry cooling power 2. Drying power 3. Dorno cooling power formulas 4. Nomograms.**—*I.L.D.*

6K–43 551.508.98

Lettau, Heinz, **Zur selbsttätigen Aufzeichnung der klimatischen Abkühlungsmittels des Davoser Frigorimeters.** [Self-recording of climatic cooling power of the Davos frigorimeter.] *Zeitschrift für Instrumentenkunde*, 57(8):333–336, **1935.** 2 diags., 5 refs. **DLC**—The author describes the automatically recording frigorimeter proposed by Dorno, Thilenius, Goldschmidt and Faust and then describes the construction and operation of a new recording device for the frigorimeter providing easier visibility and direct reading of absolute values as well as the daily changes of cooling power values. Mean hourly values recorded automatically are compared with those recorded at fixed intervals. The components of the recording device are illustrated. *Subject Heading:* **1. Davos frigorigraph.**—*I.L.D.*

1936

6K–44 551.586:612:551.506 551.588.6

*Faust, Reinhard, **Das Abkühlungsklima im Walde und auf freiem Felde nach Frigorimeterregistrierungen.** [Cooling climate in a forest and in an open field on the basis of frigorimeter recordings.] *Leipzig. Universität. Geophysikalisches Institut, Veröffentlichungen, Ser. 2,*

8(1):1–75, **1936.** 32 figs., 8 tables, 19 refs. **DLC**—Cooling power was measured with continuou recording Davos frigorimeters situated 1.5 m above the ground in a pine forest and an open field measurements were made during 1934 and 1935. The article contains the following: a detailed description of the instrumentation and the method of measurement, physical analysis of the coolin process and a derivation of the heat loss equations, a consideration of influence of meteorologica variables upon cooling power including the effect of microclimate temperature variations, th effective radiation of the frigorimeter globe, and the increase in cooling power due to precipitation variations of cooling power in microclimatic space, the daily variations of cooling power, disturbance in daily variation of cooling power; cooling power of the forest (presented as monthly, mean monthl maximum and minimum and variability); and the relationship between cooling power and air mass *Subject Headings:* **1. Cooling power data 2. Microclimatology 3. Davos frigorimeter 4. Physic of cooling 5. Forest climatology 6. Environmental effects on cooling power.**—*I.L.D.*

6K–45 551.586:612:551.506(43) 551.588.

*Lehmann, Helmar, **Mikroklimatische Untersuchungen der Abkühlungsgrösse in einem Wald gebiete.** [Microclimatic studies in cooling power in a forest.] *Leipzig. Universität. Geophysi kalisches Institut, Veröffentlichungen*, 7(4):193–255, **1936.** 18 figs., 5 tables, 4 plates, 94 refs. **DLC** —A thorough study of the influence of microclimatic factors and of local characteristics upon coolin power based upon 15,088 observations made over a period of one year in different forest stands i the vicinity of the Geophysical Observatory of the University of Leipzig. The contents of thi article are as follows: a description of the measurement procedure; the theory of cooling powe including the application of physical heat theory to cooling power, dry cooling power withou external radiation effects, radiation effects, wet cooling power; the physics of cooling power includin a discussion of the heat transfer number for free and forced circulation (dependence upon localit and air mass), albedo of the katathermometer, wet katathermometer; the daily variation of coolin power, vertical variation of cooling power, etc., cooling power gradient "isofrigores" or lines o equal cooling power, climograms and wind variation, and variation of cooling power. Observationa data for specific days are given in tables. *Subject Headings:* **1. Katathermometers 2. Coolin power data 3. Environmental effects on cooling power 4. Forest climatology 5. Leipzig, Germany** —*I.L.D.*

6K–46 551.586:612:551.506(43) 551.588.

*Lehmann, Helmar, **Physikalische und mikroklimatische Untersuchungen der Abkühlungsgrösse** [Physical and microclimatic investigations on cooling power.] *Meteorologische Zeitschrift, Biokli matische Beiblätter*, 3:107–111, **1936.** 6 figs., 3 tables, 11 refs., eqs. **DWB**—The physical theor of heat is applied to the equation of cooling power and the constants are calculated on the basi of numerous observations made at the Geophysical Observatory of the University of Leipzig. The cooling power is used as a microclimatic characteristic of forest climate as calculated by kata thermometer measurements made on different days at hourly intervals at different elevations within forest. *Subject Headings:* **1. Cooling power data 2. Katathermometers 3. Forest climatolog 4. Microclimatology 5. Leipzig, Germany.**—*I.L.D.*

6K–47 551.586:612.5 551.584.9:64

Siegenthaler, J., **Zur Frage der abkühlender Wirkung des Windes auf mehrfach bekleidet Körper.** [Problem of the cooling effect of wind upon bodies covered with several layers of clothing. *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 3(2):53, **1936. DWB**—The dependence o heat loss from a body with several clothing layers upon wind velocity was found to be represente by a concave curve up to the critical wind velocity of 2.49 m/sec. In the case of nude bodies an perhaps when the clothing layer is 1.5 fold, the critical wind velocity is so low that the curve lose its concave character. It is concluded that the cooling curve obtained with nude or lightly clothe bodies is a special case of a more general curve possessing also the characteristics found in clothe bodies. *Subject Headings:* **1. Body heat loss 2. Clothing climate.**—*I.L.D.*

1937

6K–48 551.586:612.04.

†Bedford, T., **Modern principles of ventilation and heating.** London, H. K. Lewis & Co., 1937 85 p. 23 figs., tables, 54 refs. **DLC**—Ch. 4, **Warmth and Comfort,** contains a discussion of th cooling power of the katathermometer, equivalent temperature, the globe thermometer, effectiv temperature and resultant temperature; the correlation between comfort rates and instrumenta readings; and the effect of air movement upon cooling power. In Ch. VII, **Work at high tempera tures,** the relationship between cooling power and physical work is considered. *Subject Heading* **1. Comfort indexes 2. Katathermometers 3. Effective temperature 4. Equivalent temperature 5. Globe thermometer 6. Environmental effects on cooling power.**—*I.L.D.*

6K–49 551.508.89

Brezina, E. and Schmidt, W., **Das künstliche Klima in der Umgebung des Menschen.** [The artificial climate in man's environment.] Stuttgart, Ferdinand Enke Verlag, **1937.** 212 p. **DLC**—Contains brief descriptions of the Hill katathermometer and of the Davos frigorimeter (Dorno). The formula for calculating cooling power for the Hill katathermometer and a photograph of the instrument are given. *Subject Headings:* **1. Katathermometers 2. Davos frigorimeter 3. Hill cooling power formulas.**—*I.L.D.*

6K–50 551.586:612.014.4

Conrad, V., **Physikalische und klimatische Abkühlungsgrösse.** [Physical and climatic cooling power.] *Zeitschrift für angewandte Meteorologie,* 54(7):206–216, **1937.** 4 tables, 14 refs. **DWB**—The interpretation of cooling power values into subjective sensations of comfort as worked out by Conrad, Schmid and Mörikofer are presented in tables and the cooling power values obtained by means of katathermometer and frigorimeter are compared. *Subject Headings:* **1. Comfort indexes 2. Katathermometers 3. Frigorimeters.**—*I.L.D.*

6K–51 551.586:612:551.506(43)

*Lettau, K., **Über die Abkühlungsgrösse von Witzenhausen nach dreijährigen Katamessungen.** [The cooling power in Witzenhausen based upon three years of kata measurements.] *Zeitschrift für angewandte Meteorologie,* 54(12):382–389, **1937.** 4 figs., 2 tables, 2 refs. **DWB**—The author analyzes a three year series of katathermometer readings made daily at 1300 h. The frequency distribution of all cooling power values, the seasonal frequency of cooling power values, the annual variation of the monthly mean of cooling power and interdiurnal variability of cooling power are analyzed with the data and presented graphically. *Subject Headings:* **1. Cooling power data 2. Katathermometers 3. Witzenhausen, Germany.**—*I.L.D.*

6K–52 551.586:612:551.506(93,94)

*Macky, W. A., **The comparison of the invigorating effect of the climate in different parts of New Zealand.** *New Zealand Journal of Science and Technology,* 19:164–172, **1937.** tables. **DLC**—Dry and cooling power was calculated by means of Hill's formula for the dry katathermometer for various localities in New Zealand. Data are presented in tables on the monthly mean dry and wet katathermometer cooling rates at 0900 h for Wellington and Christchurch, monthly mean cooling power in millical/cm²/sec for a dry katathermometer for various stations in New Zealand, monthly mean dry katathermometer cooling rate for Croydon, Brisbane, Sydney and Melbourne and on the daily variability of cooling power at Auckland and Wellington. The mean cooling rate of dry katathermometer on each individual day 1935–36 is shown graphically. Days are classified into comfort categories with the aid of the scale established by E. Gold. *Subject Headings:* **1. Katathermometers 2. Cooling power data 3. New Zealand 4. Australia.**—*I.L.D.*

1938

6K–53 551.586:612.5 551.508.98

Büttner, K., **Physikalische Bioklimatologie.** [Physical bioclimatology.] Leipzig, Akademie Verlagsgesellschaft, **1938.** 155 p. **DLC**—In Sec. 2 (p. 95–109), **Heat Economy,** the author discusses analytically and quantitatively the concept of cooling power, which is a measure of the amount of heat lost by an object under given conditions of temperature, wind velocity and radiation. The principles of the Hill katathermometer and of the Davos frigorimeter, the respective formulas for measuring cooling power, the application of the cooling power value to problems of human heat balance, and of underlying principles and design of the Pfleiderer-Büttner frigorigraph, which measures directly the varying surface temperature such as the skin surface, are described. A circuit diagram of the frigorigraph is presented. The subjective evaluation of cooling power is measured by a frigorimeter and frigorigraph and mean monthly values of daily variation of cooling power, monthly mean maxima and minima and absolute maxima and minima cooling power recorded at Wyk a. Föhr (North Sea Coast) are given in tables. *Subject Headings:* **1. Body heat loss 2. Katathermometers 3. Davos frigorimeter 4. Pfleiderer-Büttner frigorigraph 5. Germany.**—*I.L.D.*

6K–54 551.586:612:551.506

*Voigts, Heinrich, **Messungen der Abkühlungsgrösse in Lübeck-Travemünde.** [Measurements of cooling power in Lübeck-Travemünde.] *Meteorologische Zeitschrift,* Berlin, v. 55:21–27, **1938.** 3 figs., 6 tables, 11 refs. **DWB**—The results of cooling power measurements made with a katathermometer over a period of nine years during midday at the Lübeck-Travemünde airport are presented. Data on the mean monthly cooling power at noon for each year of the period 1928–1937, mean value of room cooling power for different wind directions, frequency distribution of the room cooling power for the given period, distribution of the diurnal variation of the cooling power

and annual variation of cooling power are given. Katathermometer measurements recalculated t the frigorimeter scale include annual variation of cooling power at Lübeck-Travemünde, Swinemünde Davos and Wahnsdorf-Dresden. *Subject Headings:* **1. Cooling power data 2. Katathermometer 3. Lübeck-Travemünde, Germany 4. Swinemünde, Germany 5. Davos, Switzerland 6. Dresden Germany.**—*I.L.D.*

1939

6K–55 551.586:612:551.506(45

*Dalmasso, Fernando, **Il potere refrigerante ceme elemente climatico a Messina.** [Coolin power as a climatic element in Messina.] *Geofisica Pura e Applicata*, 1(1):21–34, **1939.** 3 figs. 3 tables, 7 refs. **DLC, DWB**—Atmospheric cooling power was measured with a katathermomete at 1200 h and 1900 h from July 1937 to June 1938 at Messina. Data on mean monthly coolin power for the given observation periods on temperature relation, humidity, sky cover and win velocity are given in tables and the annual and diurnal variation of cooling power are analyzed In order to compare the calculation of the cooling power by means of the Hill formulas the autho determines the experimental variables which are functions of wind velocity and by which the em pirical formulas of Hill are connected: the seasonal variation of these connections and the influenc of solar radiation, air temperatures and wind direction upon this correction are discussed. *Subje Headings:* **1. Katathermometers 2. Cooling power data 3. Hill cooling power formulas 4. En vironmental effects on cooling power 5. Messina, Italy.**—*I.L.D.*

6K–56 551.586:612:551.50

*†Stone, R. G., **A note on cooling power.** (In: Price, A. Grenfell, **White settlers in the tropics** N. Y., American Geographical Society, **1939.** p. 293–299. 2 figs., 2 tables, refs.) **DLC**—Th author discusses the physical and physiological meaning of the concept of cooling power and it expression in terms of human subjective sensations of comfort and presents a nomogram for com puting the dry cooling power in the shade (reproduced from Gold, *see* 6K–41), a nomogram fo computing the net cooling power in the shade (adapted from C. P. YAGLOU and A. VOEĬKOV **Calibration of the kata-thermometer over a wide range of air conditions.** *Journal of Industria Hygiene*, v. 10, 1928) and data on mean monthly cooling at various stations as determined by eac dry and wet katathermometer. An extensive bibliography on cooling power is included. *Subje Headings:* **1. Katathermometers 2. Cooling power data.**—*I.L.D.*

1940

6K–57 551.586:612:551.508.9

Kestermann, Alfred, **Abkühlungsstudien mit besonderer Berücksichtigung des Frigorigraphe nach Büttner und Pfleiderer.** [Cooling power studies with particular reference to the Büttner an Pfleiderer frigorigraph.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 7(1):1–16, **1940** 17 figs., 14 tables, 19 refs. **DWB**—The physical processes involved in heat loss to the surroundin atmosphere from a physical body are analyzed theoretically and equations expressing heat loss b radiation and convection of a dry physical object are developed. The theoretical principles under lying the measurement of cooling power by spherical instruments such as the katathermometer frigorimeter and frigorigraph are discussed and a detailed account is given of the construction circuit arrangement and operation of the Pfleiderer frigorigraph, including a description of the cli matic chamber within which measurements are made. The influence of air temperature upon D (difference in temperature between the skin temperature and the surrounding air temperature and the effect of radiation are analyzed. The operation of the Hill katathermometer is analyze including the determination of the wind constant, the radiation and conduction factors and radiatio absorption of the instruments. Also the results of parallel measurements of cooling power by mean of two frigorigraphs are compared. The positions of the instruments were as follows: roof tower garden, thermometer shelter-garden, tree-garden, bush-garden and ground-garden. The experi mental data are given in tables and in graphs. *Subject Headings:* **1. Katathermometers 2. Davo frigorimeter 3. Pfleiderer-Büttner frigorigraph 4. Environmental effects on cooling power.**—*I.L.D*

1941

6K–58 551.586:612:551.506(43

*Voigts, H., **Abkühlungsgrösse, Sonnenscheindauer und UVE an den deutschen Meeresküsten** [Cooling power, sunshine duration and ultra-violet radiation on the German sea coasts.] *Zeitschri für angewandte Meteorologie*, 58(6):169–186, **1941.** 5 figs., tables, 16 refs. **DWB**—Methods o measuring cooling power are discussed critically. The annual variation of cooling power at Trave münde measured with a frigorimeter is discussed. The relationship of the highest monthly mea to lowest monthly mean is stressed. In Travemünde it is 1.9, for Swinemünde 2, for Davos 3 an for Wahnsdorf 3.25. Also the mean daily sunshine duration at Travemünde is given in a table

he UV values are 18% lower in maritime than in continental atmosphere. *Subject Headings:* **Cooling power data 2. Davos frigorimeter 3. Travemünde, Germany.**—*I.L.D.*

6K–59 551.586:612:551.506(453)

*Zanon, Francesco Saverio, **Osservazioni frigorimetriche al Lido di Venezia.** [Frigorimetric bservations on the Lido of Venice.] *Geofisica Pura e Applicata*, 3(3):97–124, **1941.** 7 figs., tables, 14 refs. **DWB**—The physical principles of the Hill katathermometer and the Davos igorimeter are discussed and illustrations and diagrams of the devices and the relevant equations re presented. Cooling power was measured four times daily by means of a frigorimeter during 940 and the monthly mean, the cooling power values, mean monthly max. and min. atmospheric mperature, wind velocity and mean monthly sunshine duration are presented and analyzed. It shown that the Hill formula needs corrections for the climate of Venice. The bioclimatologic gnificance of cooling power, in particular its subjective sensation, is discussed. *Subject Headings:* **Davos frigorimeter 2. Cooling power data 3. Hill cooling power formulas 4. Venice, Italy.** *-I.L.D.*

1942

6K–60 551.501.4/6:551.586

Corlette, Cyril Ernest, **On the heat-absorbing or heat-lifting capacity of wind in relation to ie human body, with a table for calculating it.** Gibson, W. H. H., **Note on a diagram for the cal-ulation of the heat-absorbing capacity of a cubic metre of air, based on the tables of Dr. C. E. orlette.** Corlette, C. E., **Measurement of the drying capacity of wind. On the calculation of the eat and moisture dissipated from the bodily respiration, with a table designed to make calculation asy at any temperature, any humidity and any pressure of the air.** Reprinted from: *Medical ournal of Australia*, April 18, May 23 and Sept. 5, **1942.** 20 p. figs., tables. **GB-MO**—CORLETTE iscusses physiology of heat exchange and temperature regulation and gives a table of heat required o raise to 33°C and saturate a cubic meter of air for air temperature −60° to +55°C. He then troduces the effect of wind velocity. Gibson designed a nomogram connecting air temperature nd relative humidity with heat absorbing capacity. (*Same item as* 2D–150, April 1951, *MAB.*) *ubject Headings:* **1. Cooling power 2. Drying power 3. Nomograms.**—*C.E.P.B.*

6K–61 551.586:612:551.506(453)

*Puppo, Alessandro, **Il potere refrigerante dell'aria e la velocità del vento. (Registrazioni igorimetriche al Lido di Venezia.)** [Cooling power of air and wind velocity. Frigorimetric data the Lido, Venice.] *Rivista di Meteorologia Aeronautica*, 6(4):159–166, **1942.** 2 figs., table, 7 refs. **MH-BH**—A description is given of the frigorimeter installed at the Center of Bioclimatology the Ospedale al Mare di Venezia-Lido. Various formulas for measuring cooling power are pre-nted. The results of cooling power measurements carried out daily are presented and cooling ower is analyzed as a function of air temperature and wind velocity. *Subject Headings:* **1. Cooling ower data 2. Davos frigorimeter 3. Venice, Italy.**—*I.L.D.*

1943

6K–62 551.586:612 551.508.98

†Stone, R. G., **On the practical evaluation and interpretation of the cooling power in bioclima-ology, Pt. 1–2.** *American Meteorological Society, Bulletin*, 24(8):295–305; 24(9):327–339, **1943.** figs., 89 refs. **DWB**—In these two papers the author presents a comprehensive and critical review the literature dealing with the measurement of cooling power and its use in measuring the effect atmospheric cooling on the body. The discussion includes: a description of the physical principles the katathermometer, the application of the kata by LEONARD HILL, the limitation of the kata oth as a physical instrument and as an imitator of the human body, the value of the physical cooling ower in human climatology, the dry cooling power formula by LEONARD HILL and its various modi-cations, a nomogram for computing dry cooling power, the Davos (Dorno) frigorimeter formulas, comparison of the various cooling power formulas, the effect of barometric pressure upon cooling ower, calculation of solar radiation effects in the dry cooling power formulas, the computation of a ooling factor for the dry cooling power, the features of the Büttner frigorigraph and of Yaglou's esting globe, wet cooling power formulas, calculation of rate of kata heat loss by evaporation alone, nterpretation of cooling power by sensation scale and correlation of cooling power with skin tem-erature of the body. *Subject Headings:* **1. Katathermometers 2. Davos frigorigraph 3. Pfleiderer-üttner frigorigraph 4. Cooling power data 5. Hill cooling power formulas 6. Dorno cooling ower formulas 7. Physiological climatology.**—*I.L.D.*

1945

6K–63 551.586:612:551.506(494)

*Bider, M. and Thams, Chr., **Messungen der Abkühlungsgrösse nord- und südwärts der Alpen.** Measurement of the cooling power north and south of the Alps.] *Switzerland. Meteorologische*

Zentralanstalt, Annalen, p. 1–6, 1945. tables, 11 refs. **DWB**—Three methods of measuring th cooling effect of the atmosphere are described. The Davos frigorimeter used at Basel (1929–1940) Zürich and Locarno (1936–1944) is described in detail and the observations made at those place presented in consolidated tables and compared with respect to exposure. The author conclude that solar radiation, wind and humidity observations must be used in combination with the frigori metric observations to give an integrated quantitative estimate of cooling effect on man or materia (*Same item as* 10–84, Oct. 1950, *MAB.*) *Subject Headings:* **1. Cooling power data 2. Davos frig orimeter 3. Switzerland 4. Alps.**—*M.R.*

6K–64 551.586:612:551.506(45,67

*Bossolasco, Mario, **Il potere refrigerante dell'aria a Messina ed a Mogadiscio.** [Cooling powe of the atmosphere in Messina and Mogadiscio.] *Geofisica Pura e Applicata*, 7(1/4):33–61, 194 fig., 8 tables, 16 refs. **DWB**—The results of dry and wet katathermometer observations take during 18 months at Messina and during the International Polar Year 1932–33 at Mogadiscio ar given and analyzed. The annual variation of cooling power, its dependence upon wind velocity an its relationship to geographic factors are analyzed. The limitations of the cooling power formula of L. Hill and modifications of the formulas are considered. *Subject Headings:* **1. Dry and we katathermometers 2. Hill cooling power formulas 3. Cooling power data 4. Messina, Ital 5. Mogadiscio, Somaliland.**—*I.L.D.*

6K–65 551.586:612:551.506(9

*†Siple, Paul A. and Passel, Charles F., **Measurements of dry atmospheric cooling in subfreezin temperatures.** *American Philosophical Society, Proceedings*, 89:177–199, 1945. 2 figs., 7 table map, ref. **DLC**—A series of atmospheric cooling measurements were made at Little Americ Antarctica in 1941 by means of a relative comfort thermometer which consisted of a cylinder "abou three-fourths filled with 250 gms of melted snow water and completely sealed after a thermomete had been suspended in the center of the cylinder and almost completely immersed in the water. This article contains a review of the literature on the correlation of atmospheric cooling powe with sensation, a description of the construction and use of the relative comfort thermometer, a analysis of the components of cooling and of the wind chill factor, a discussion of the choice of unit for expressing the cooling rate, the construction of a cooling formula, namely $K_0=(\sqrt{V}\times 10$ $+10.45-V)(33-T_0)$ and a consideration of possible sources of experimental errors and of th effect of extreme cooling on the human body. Data include atmospheric cooling of 250 gms c water in still air, light moderate and strong breeze and blizzard, atmospheric cooling due to variation in wind velocity (wind chill factor), atmospheric cooling values for varying conditions of wind an temperature, average cooling power of the atmosphere for Antarctic stations, average monthl temperatures and wind velocity for various Antarctic stations. Observations on the freezing tim of exposed human flesh in path of cold wind and a table giving descriptive terms with their dr cooling values appropriate to different temperatures and wind velocities are included. *Subje Headings:* **1. Cooling power data 2. Wind chill 3. Physiological climatology 4. Antarctica.**—*I.L.D*

1946

6K–66 551.586:612:551.501.

Bedford, T., **Environmental warmth and its measurement. A book of reference prepared fo the Royal Naval Personnel Research Committee of the Research Council.** *Medical Research Counc of Great Britain War Memorandum*, No. 17. 1946 (Reprinted 1952). 40 p. **DLC**—The discussio of the physics and physiology of thermal balance is followed by a description of apparatus an methods provided in vessels of the Royal Navy for measuring atmospheric temperature, radiatio and wind velocity. A description is given of the use of the silvered katathermometer 130°–125° and 150°–145°F for measuring air movement. A photograph of the thermometer, nomograms fo computing wind velocity and illustrative examples are presented. *Subject Headings:* **1. Heat balanc 2. Silvered katathermometers 3. Body heat loss 4. Nomograms.**—*I.L.D.*

1948

6K–67 551.55:612.014.4:551.58

Court, Arnold, **Wind chill.** *American Meteorological Society, Bulletin*, 29(10):487–493, 194 table, 6 refs. **DWB**—A review of the history of the concept "wind chill," a consideration of it role in the process of heat loss from the human body, a critical examination of the various formula prepared to express the dry convective cooling power of the atmosphere or the "wind chill," a com parison of various experimental formulas for determining convective heat loss and a considerati of the usefulness of wind chill computation for physiological needs. *Subject Headings:* **1. Wind chi 2. Body heat loss 3. Thermal balance formulas.**—*I.L.D.*

6K–68 551.586:551.508.98(471)

*Lunelund, Harald, **Messung der Abkühlungsgrösse in Südfinnland mit dem Katathermometer.** Measurement of the cooling power in South Finland with the katathermometer.] *Finska Vetenaps-Societeten, Helsinki, Commentationes Physico-Mathematicae,* 8(3), **1948.** 26 p. 4 figs., 13 bles, 15 refs., 13 eqs. **DLC**—Various formulas and instruments for determining the biological ective temperature are described. These attempt to integrate the effect of wind, radiation, mperature and humidity or combinations of these. The formulas of VINCENT, LINKE and BÜTTNER d the Davos frigorimeter and Hill katathermometer are especially considered. Measurements ade in 1944 and 1945 at Dalsvik and Helsinki, Finland, with a katathermometer are summarized various ways and compared with Davos frigorimeter measurements made at Helsinki in 1926–27 d 1930–31. Some observations were made in sunshine in open country, some in shade or near ildings and some indoors with various types of heating. Both wet and dry cooling power were termined. (*Same item as* 2.6–132, June 1951, *MAB.*) *Subject Headings:* **1. Davos frigorimeter Cooling power data 3. Katathermometers 4. Helsinki, Finland 5. Dalsvik, Finland.**—*M.R.*

1949

6K–69 551.586:612

Lossnitzer, H., **Theoretische und experimentelle Bemerkungen zur Bestimmung der Abkühngsgrösse.** [Theoretical and experimental remarks on the determination of cooling power.] *eteorologische Zeitschrift,* 46(12):545–549, **1949.** refs. **DWB**—The physical basis of cooling power explained by W. SCHMIDT's theory of "Austausch" rather than by the classical hydrodynamical inciples. Hill's formula for cooling power is discussed and the application of the cooling power ncept to the heat loss from the human body is considered in reference to heat production and at loss. *Subject Headings:* **1. Physics of cooling 2. Hill cooling power formulas 3. Body heat ss 4. Physiological climatology.**—*I.L.D.*

6K–70 551.55:612.014.4

Siple, Paul A., **Clothing and climate.** (In: Newburgh, L. H., ed., **Physiology of heat regulation d the science of clothing.** Phil., W. B. Saunders, **1949.** p. 389–442.) **DLC**—Contains a dission of wind chill and index showing the rate of cooling of a heated body exposed to the wind. bles giving the approximate dry cooling values in kg cal/1°C per square meter per hour in the ade for different wind velocities, the sensible temperatures corresponding to different degrees wind chill and the wind velocities and temperatures causing the freezing of exposed flesh are esented. Also the role of clothing in wind chill is discussed. *Subject Headings:* **1. Wind chill Physiological climatology 3. Clothing climate.**—*I.L.D.*

6K–71 551.586(02) 551.508.98

Voigts, Heinrich, **Wetter, Klima, Leben.** [Weather, climate, life.] Hildesheim, A. Lax, **1949.** 0 p. **DLC**—A concise and elementary textbook providing: 1) an account of physical weather ocesses and of the formation of large scale weather, 2) an explanation of the weather map, 3) the ysical basis of the thermal balance of the human body and the measurement of heat loss and the relationship between microclimate and plant climate and between weather and crop yield. e chapters are as follows: (1) Importance of clouds in the recognition of atmospheric processes, slide and invasion of fronts; (2) Wind (includes measurement of wind velocity and direction, nd protection, etc.); (3) Weather and weather map; (4) Large scale weather and weather processes;) Climate, weather and man; measurement of cooling off by katathermometer and frigorimeter; easurement of total radiation; (6) Microclimate and plant-climate (a summary of Geiger's **Climate ar the ground**) and (7) Weather and yield of grain crops, fruits and vegetable. There are numerous ustrations and diagrams. (*Same item as* 4.1–17, Jan. 1953, *MAB.*) *Subject Headings:* **1. Meteorgy 2. Climatology 3. Bioclimatology 4. Textbooks 5. Katathermometers 6. Davos frigmeter.**—*I.L.D.*

1950

6K–72 551.584.9:646

Breckenbridge, John R. and Woodcock, Alan H., **Effects of wind on insulation of Arctic clothing.** *S. Quartermaster Corps. Research and Development Branch. Environmental Protection Section, eport,* No. 164, July **1950.** 41 p. 17 figs., tables, 14 refs. **DWB**—The insulating values of several pes of developmental and standard Arctic clothing assemblies were investigated with the aid of e electrically heated copper man dressed in U. S. standard army issue, experimental fiberglass-lined d wool pile-lined garments and developmental Canadian and United Kingdom items. A descripn of the copper man and the test procedure including the equations for expressing insulation are esented. The experimental results are presented in graphs and tables (in an appendix). The ationship between the insulating value of clothing and wind speeds, and the usefulness of "wind ill" for predicting cold stress on clothed men are discussed. *Subject Headings:* **1. Clothing climate Wind chill.**—*I.L.D.*

6K–73 551.524.31:551.586:61

*Henneberger, Charlotte, **Tagesgang und Komponenten der Abkühlungsgrösse.** [Dai variation and components of cooling power.] *Archiv für Meteorologie, Geophysik und Bioklimatologi Ser. B*, 2(1–2):86–119, **1950.** 7 figs., 5 tables, 20 refs., 8 eqs. English and French summaries p. 8 German p. 117–118. **DLC**—Hourly observations of cooling power were made at Davos 1941–4 with a frigorimeter and registering watt-hour counter, and were compared with meteorologic elements. Cooling power in m cal/cm²/sec is related to excess θ of frigorimeter over air temperatu by $(0.145+0.117v)\theta$ where v is wind velocity in m/sec. Rain and snow increase this by about 4 cal. Diurnal variation depends on diurnal variation of wind, temperature and radiation; cooli is least before noon and greatest in evening. Range is 4–6 m cal and varies little through yea Diurnal variation is tabulated separately by months for radiation and overcast days and for "da of illness" (Krankentage). (*Same item as* 2.3–90, March 1951, *MAB.*) *Subject Headings:* **1. Cooli power data 2. Physiological climatology 3. Davos frigorimeter 4. Davos, Switzerland.**—*C.E.P.*

6K–74 551.586:61

*Spangenberg, W. W., **Meteorologische Beobachtungen an schwülen Tagen.** [Meteorologic observations on sultry days.] *Zeitschrift für Meteorologie*, 4(1/2):8–16, Jan./Feb. **1950.** 2 figs 12 tables, 31 refs. **DWB**—Author took full meteorological and physiological observations on sultr feeling days at Schwerin 1929–1949. Mean number 20 a year, April–Sept. No close connectio with thunder. Tables and diagrams show relations to: humidity and temperature, cooling powe wind speed and direction, cloudiness and equivalent temperature. Sultriness appears to be a sociated with high temperature and relatively high humidity; equivalent temperature only to limited extent. Ventilation is important; the effect of radiation is obscure. The feeling of sultrine is partly physical-psychological. (*Same item as* 9–146, Sept. 1950, *MAB.*) *Subject Heading* **1. Cooling power data 2. Sultriness 3. Comfort sensation 4. Schwerin, Germany.**—*C.E.P.B.*

6K–75 551.586:612:551.524.33:551.508.98(49

Thams, J. Chr. (*Locarno-Monti*), **Die Abkühlungsgrösse.** [Cooling power.] *Leben u Umwelt*, Aarau, Switzerland, 6(11):241–246, Aug. **1950.** 4 figs., 3 refs. **DLC**—A network of m teorological stations has been operating in Switzerland since 1864 under a uniform observation program. Biometeorological investigations at present show that the usual meteorological o servations are not sufficient for determining climatic characteristics. The value of cooling pow is an important physiological factor. The instruments (katathermometer, frigorimeter) construct for measurement of cooling power are described. Monthly mean air temperatures and values cooling power are analyzed for three stations (Locarno-Monti, Basel and Davos). (*Same item* 4.6–219, June 1953, *MAB.*) *Subject Headings:* **1. Katathermometers 2. Davos frigorimet 3. Switzerland.**—*N. T. Zikeev.*

6K–76 551.586:551.508.9

Wachter, Heinz, **Physikalische Überlegungen zur Abkühlungsgrösse.** [Physical reflectio about cooling power.] *Germany. Deutscher Wetterdienst in der U. S.-Zone, Berichte*, No. 12:12 **1950.** eqs. **DLC**—Remarks on the principles of instruments for measuring cooling power. (*Sa item as* 11–145, Nov. 1950, *MAB.*) *Subject Heading:* **1. Cooling power measurement.**—*C.E.P.B.*

6K–77 551.508.98 551.586:6

Wierzejewski, H., **Theoretisches und Konstruktives zur Messung der Abkühlungsgröss** [Theory and practice in the measurement of cooling power.] *Archiv für Meteorologie, Geophys und Bioklimatologie, Ser. B*, 2(1/2):65–85, **1950.** 4 figs., 22 refs., 9 eqs. German, English a French summaries p. 65–66. **DLC**—Cooling power of the air is important in bioclimatology. T effect of various factors is set out and the heat balance finally expressed in an approximate equati involving only wind, air temperature and short-wave radiation. The principles of various instr ments for measuring it (including the katathermometer) are briefly described. The constructi and usage of the new (1931) type of Davos frigorimeter are described and the constants set o This instrument measures electrically the heat loss of a copper sphere (blackened chemicall heated electrically. Cooling power varies rapidly and instruments for obtaining hourly reco are mentioned. (*See item* 2.3–90, March 1951; *same item as* 2.4–26, April 1951, *MAB.*) *Subj Headings:* **1. Davos frigorimeter 2. Katathermometers 3. Cooling power 4. Body heat lo** —*C.E.P.B.*

1951

6K–78 551.586:612:551.501.6(7

Currie, B. W., **Sensations isopleths on a wind-temperature diagram for winter weather on t Canadian prairies.** *American Meteorological Society, Bulletin*, 32(10):371–374, Dec. **1951.** 2 fig 3 refs. **DWB**—Sensation records of weather kept by 35 moderately active individuals during tw

ccessive winters were used to construct sensation isopleth on a wind temperature diagram. A gh consistency of responses was obtained for a given range of temperature and wind conditions. comparison of the sensation isopleths with wind chill isopleths calculated by the formula of SIPLE ows that the sensation isopleths are not lines of constant wind chill. The sensations are very sitive to wind speeds greater than 20 mi/hr instead of being less sensitive as are the wind chill pleths. A critical comment on the physical and physiological difficulties of subjective evaluation thermal stress by COURT and SISSENWINE is appended. (*Same item as* 3.11–245, Nov. 1952, *AB.*) *Subject Headings:* **1. Comfort indexes 2. Siple wind chill formula 3. Wind chill 4. Body at loss 5. Canadian Prairies.**—*I.L.D.*

6K–79 551.586:612:551.506

*Lauscher, Friedrich, **Über die Verteilung der Hillschen Abkühlungsgrösse auf der Erde.** [On e distribution of Hill's cooling power over the earth.] *Archiv für Meteorologie, Geophysik und oklimatologie, Ser. B*, 3:275–288, **1951.** 4 figs., 3 tables, 4 refs. German, English and French mmaries p. 275–276. **DLC**—Using Hill's formula $H = (0.13 + 0.47\ v^{0.5})(36.5 - t)$, HANN-SÜRING's rld temperature charts and his own values of wind speed, author calculated cooling power for ch strip 10° lat. ×20° long. for Jan. and July. Values are shown in tables and world charts. ean values: Northern Hemisphere Jan. 32.7 mg cal/cm²/sec, July 16.5; Southern Hemisphere n. 26.2, July 36.2; world year 27.9. Peculiarities of the distribution are discussed. (*Same item as* 2–177, Feb. 1952, *MAB.*) *Subject Headings:* **1. Cooling power data 2. Calculated cooling power Hill cooling power formulas.**—*C.E.P.B.*

6K–80 551.586:612

Mrose, Helmut, **Über die Ursachen der Schwüleempfindung.** [On the causes of the sensation sultriness.] *Zeitschrift für Meteorologie*, 5(2):55–58, Feb. **1951.** table, 8 refs. **DWB**—A feeling sultriness always occurs with equivalent temperature of 50°C or wet-bulb 18°C. It may occur th lower heat content when the sky radiation is strong, especially in the infrared from a thin sheet middle cloud. Observations with two katathermometers in Friedrichroda showed that in sultry, udy weather the cooling power was greater under a shelter than in the open. The sultry feeling th diffuse radiation is attributed to the uniformity of temperature and hence the absence of air otion. (*Same item as* 2.8–149, Aug. 1951, *MAB.*) *Subject Headings:* **1. Cooling power data Environmental effects on cooling power 3. Sultriness 4. Comfort indexes.**—*C.E.P.B.*

6K–81 551.586:612:551.508.98(54)

Murgai, M. P., **Measurement of human comfort.** *Science and Culture*, Calcutta, 16(12):543–5, June **1951.** refs. **DWB, DLC**—The author discusses the measurement of human comfort as termined by the heat interchange between the body and its environment by means of dry bulb mperature, by the use of the katathermometer, by atmospheric humidity and by the mean radiation the surroundings. The principle and use of the katathermometer and its construction are de-ribed; the significance of radiant temperature and the use of the corrected effective temperature e considered. It was found that Indian subjects were comfortably cool at a corrected effective mperature of 71°F, comfortable up to 79°F, uncomfortable above 80°F. (*Same item as* 3.8–194, ıg. 1952, *MAB.*) *Subject Headings:* **1. Physiological climatology 2. Heat effects on man 3. Kata-ermometers 4. India.**—*I.L.D.*

6K–82 551.586:612.014.4

Spangenberg, W. W., **Bemerkungen zur Frage der Schwülegrenze.** [Remarks on the question the sultriness limit.] *Meteorologische Rundschau*, 4(1/2):24–28, Jan./Feb. **1951.** fig., table, efs. **DWB**—Author examines the generally accepted limit of an equivalent temperature of 56°C d finds that this is only accurate with an air temperature near 25°, varying with temperature. He mpares related temperature and relative humidity given by sultriness limits of 14.08 mm vapor essure, 56° equivalent temperature, 24° and 25° effective temperature, and 19° dew point and so discusses cooling power as a measure of sultriness. (*Same item as* 2.6–134, June 1951, *MAB.*) *bject Headings:* **1. Comfort indexes 2. Cooling power 3. Sultriness 4. Equivalent temperatures.** *C.E.P.B.*

1952

6K–83 551.508.98 551.586:612(02)

Bradtke, Franz and Liese, Walther, **Hilfsbuch für Raum- und aussenklimatische Messungen r hygienische, gesundheitstechnische Zwecke.** [Manual for measuring indoor and outdoor mates for hygienic and industrial medical purposes.] 2nd rev. ed. Berlin, Springer Verlag, **1952.** 8 p. 37 figs. **DLC**—This handbook includes a description of the construction and the physical inciples of instruments for measuring cooling power: they include the Frankenhauser "Homöo-erm," the cooling recorder of Jätten and Grube and the Davos frigorimeter. A very detailed

account of katathermometry is presented. It includes a description and use of the instrument, the physical principles of the cooling power value, cooling power in still air, calibration of the katathermometer, cooling power in moving air, the radiation component of cooling power values, influence of atmospheric pressure upon cooling power measurements with the dry, wet and silvered katathermometer, the deviation of an equation between cooling power and forehead temperature and the derivation of comfort numbers. (*Same item as* 3.11–244, Nov. 1952, *MAB.*) *Subject Headings:* **1. Frankenhauser "Homöotherm" 2. Jätten cooling recorder 3. Grube frigorimeter 4. Davos frigorimeter 5. Comfort indexes 6. Dry and wet katathermometers 7. Silvered katathermometers.**—*I.L.D.*

6K–84 551.508.98:551.586(432.2)

*Koch, Horst Günther, **Vergleichende Terminmessungen der Abkühlungsgrösse mit Katathermometern in Thüringen 1947–51.** [Comparative regular measurements of the rate of cooling power with katathermometers in Thüringia, 1947–51.] *Angewandte Meteorologie*, 1(7):203–211, Oct. 1952. 3 figs., 11 tables, 10 refs. **DWB**—Observations with dry and wet Hill katathermometers thrice daily at 10 stations are summarized, discussed and compared with earlier observations and with values calculated from air temperature and wind speed by formulas of Hill and Büttner. Differences are mostly due to radiation and strong wind. Variations with height above sea, 100–190 m, are shown in relation to wind and temperature and exposure at individual stations. (*Same item as* 4.3–65, March 1952, *MAB.*) *Subject Headings:* **1. Dry and wet katathermometers 2. Cooling power data 3. Environmental effects on cooling power 4. Thüringia, Germany.**—*C.E.P.B.*

6K–85 551.508.98:551.586:612

Pfleiderer, H., **Kritische Betrachtungen über die Abkühlungsgrösse.** [Critical remarks on the cooling rate.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:267–270, 1952. 19 refs. **DWB**—Development of instruments for measuring cooling rate is summarized. Results depend on the physical constants of the apparatus; the error of the Davos frigorimeter is discussed and the Pfleiderer-Buettner frigorimeter described. (*Same item as* 4.5–61, May 1953, *MAB.*) *Subject Headings:* **1. Cooling power measurement 2. Davos frigorimeter 3. Pfleiderer-Büttner frigorigraph.**—*C.E.P.B.*

6K–86 551.586:612(99):551.50

Sauer, Waldemar, **Untersuchung der Abkühlungsgrösse in der Antarktika und ihre Bedeutung für das menschliche Leben in den Schnee- und Eisklimaten der Erde.** [Investigation of the cooling rate in the Antarctic and its importance for human life in the snow and ice climates of the earth.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:271–273, 1952. fig., ref. **DWB**—On the 3rd Byrd Expedition, P. Siple constructed a frigorimeter from a water-filled pyrolit cylinder and determined a "wind chill" formula $K_0/T = 797.1/t$ and a cooling power formula $K = (\sqrt{100v} + 10.45 - v)(33 - T)$ where T is air temperature °C, t is time of freezing and v is wind speed in m/sec. Mean annual variation is calculated for 9 points in Antarctic. Frostbite occurs with cooling rate of 1300–1500 kcal/m²/h; at 2000 travel is dangerous. (*Same item as* 4.4–257, April 1953, *MAB.*) *Subject Headings:* **1. Cooling power data 2. Frostbite 3. Calculated cooling power 4. Wind chill formulas 5. Antarctica.**—*C.E.P.B.*

1953

6K–87 551.508.98 551.586:61

†Brodniewicz, Aleksander, **Znaczenie katatermometrii w klimatologii lekarskiej.** [The importance of katathermometry for medical climatology.] *Przeglad Meteorologiczny i Hydrologiczny*, Warsaw, 6(1/2):110–117, 1953. 22 refs. English summary p. 117. **DWB**—The significance of katathermometric measurements in medical climatology, in applied climatology, such as construction of residences, and in climatic classification is discussed. Katathermometric measurements in Poland by Nowakowski and Gadzikiewicz and frigorimeter measurements by Stenz and Bogucki before 1939 and the measurements made by the Balneoclimatic Institute at Poznan at Kolobrzeg and Inowrocław are summarized. The Polish literature on cooling power measurement is reviewed. *Subject Headings:* **1. Katathermometers 2. Cooling power data 3. Medical climatology 4. Poland.**—*Based on author's abstract.*

6K–88 551.586:612:551.506(431

*Maede, H. and Matzke, H., **Die Abkühlungsgrösse in ihrer Abhängigkeit von typischen Wetterlagen, dargestellt am Beispiel von Greifswald.** [The cooling power in relation to typical weather situations, as illustrated by Greifswald.] *Zeitschrift für Meteorologie*, 7(10):307–313, Oct. 1953. fig., 4 tables, 12 refs. **DWB**—The mean cooling power, observed over a period of 13 years, is given for each month, separately for 12 characteristic weather situations. The cooling power was measure

the heat loss from a freely exposed black copper sphere with the temperature 36.5°C. It varies the average from 31.0 in Jan. to 11.2 cal $cm^{-2}S^{-1}$ in July and Aug. The standard deviation is 5 in April and 2.8 cal $cm^{-2}S^{-1}$ in Aug. (*Same item as* 6.1–315, Jan. 1955, *MAB.*) *Subject Headgs:* **1. Cooling power data 2. Synoptic climatology 3. Greifswald, Germany.**—*A.A.*

1955

6K–89 551.586:612:551.506(43)

Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, **eutsches Meteorologisches Jahrbuch, Teil IV, Heft 2, 1954. Beobachtungen des Meteorogischen Observatorium Wahnsdorf.** [German Meteorological Yearbook, Vol. 4, Pt. 2, Observaons at the Wahnsdorf Meteorological Observatory.] Berlin, Akademie Verlag, **1955.** 138 p. **WB**—This meteorological yearbook contains in addition to the regular meteorological observations, ourly values of cooling power for each day of the year, daily means and monthly means. Atospheric cooling power is measured with a Davos frigorimeter, the copper globe of which is situated 5 m above the ground at the same height as wind velocity and atmospheric temperature and hudidity. *Subject Headings:* **1. Cooling power data 2. Davos frigorimeter 3. Wahnsdorf, Germany.** *I.L.D.*

6K–90 551.524.1:551.553.11(431) 551.508.98

***Matzke, H. and Vilkner, H. (*Met. Obs., Greifswald*), **Der Einfluss von Land- und Seewind f die Ablühlungsgrösse.** [Influence of land and sea breezes on cooling power.] *Zeitschrift für eteorologie*, Berlin, 9(3):65–77, March **1955.** 5 figs., 4 tables, 10 refs. Also: Geselle, P. and atzke, H., **Ein weiteres Gerät zur Registrierung der Abkühlungsgrösse.** [A further apparatus r recording cooling power.] *Ibid.*, 9(4):120–123, April **1955.** 3 figs., 3 refs. **DWB, DLC**—1) The thors analyze statistically all the recorded hourly means of cooling power and the simultaneously corded wind directions for the period Jan. 10, 1951–Sept. 30, 1954 at the Meteorological Observatory Greifswald. Cooling power was measured with a frigorimeter. Data are given for the seasonal eans of cooling for different wind directions in Lübeck-Travemünde 1931–36 (katathermometer ale); and monthly means of cooling power and of wind velocity at Greifswald (1951–54), monthly ean of Baltic water temperature, air temperature cooling power, global radiation in Greifswald uring 1951–54. The daily variation of cooling power and wind intensity, sea and land breezes in ourly means and the annual variation of cooling power and wind intensity during land and sea eezes in monthly means are analyzed. 2) A frigorimeter, improved from the simple apparatus therto in use at Greifswald, is described with photo and constructional diagram. It gives the oling power hour by hour on an open scale. Though somewhat complicated it is very reliable. *ubject Headings:* **1. Davos frigorimeter 2. Environmental effects on cooling power 3. Cooling ower data 4. Greifswald, Germany.**—*I.L.D., C.E.P.B.*

SUPPLEMENTARY MATERIAL

6K–91 551.586:551.506(437) 551.508.98

***Kacvinsky, Martin, **Schladzovanie v Bratislave a vo Vysokých Tatrách roku 1951.** [Cooling Bratislava and in the High Tatra mountains in 1951.] *Meteorologické Zprávy*, 5(6):154–158, **52.** 3 figs., 7 tables, 4 refs. **DLC**—Measurement with recording Davos frigorimeters was started Slovakia in 1950. The instrument and its operation are described in detail and illustrated by notographs and a schematic diagram. Monthly cooling power data for 1951 at various times of e day are presented for Bratislava (frigorimeter) and two locations in the Tatra Mountains (Hill atathermometer). Average monthly cooling power values at 14.00 h for Starý Smokovec (Tatra ts.) are also given for the period 1933–1951. *Subject Headings:* **1. Davos frigorimeter 2. Cooling ower data 3. Bratislava, Czechoslovakia 4. Tatra Mountains, Czechoslovakia.**—*G.T.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of publication, the pagination may be omitted.

Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia, No. 3, 1955

Fedorov, K. N.: **Vetrovye techeniia v more peremennoĭ glubiny,** [Wind currents in a sea of variable depth], p. 223–233

Monin, A. S.: **O diffusii s konechnoĭ skorost'iu,** [Diffusion with finite speed], p. 234–248

Feĭgel'son, E. M.: **Uchet izbiratel'nogo pogloshcheniia v teorii luchistogo teploobmena v atmosfere,** [Calculation of selective absorption in the theory of radiative thermal balance in the atmosphere], p. 249–260

Glazova, E. F. and Laĭkhtman, D. L.: **Elementarnaia teoriia uvlazhnennogo isparitelia i ego primenenie dlia izucheniia turbulentnosti,** [Elementary theory of moist evaporimeter and its use in investigation of turbulence], p. 278–281

Akademiia Nauk SSSR, Izvestiia, Ser. Geograficheskaia, No. 5, 1954

Leningrad. Arkticheskii Nauchno-Issledovatel'skii Institut: **O novykh sovetskikh issledovaniiakh i otkrytiiakh v Tsentral'noi Arktike,** [New Soviet investigations and discoveries in the Central Arctic], p. 3–16

No. 4, July/Aug. 1955

Budyko, M. I.: **Klimaticheskie usloviia uvlazhneniia na materikakh, Soobshchenie II,** [Climatic conditions for moistening of continents, Pt. 2], p. 3–15

Girs, A. A.: **K voprosu ob izuchenii obshcheĭ tsirkuliatsii atmosfery,** [Investigation of the general circulation of the atmosphere], p. 16–28

Neĭshtadt, M. I.: [**Review of**] **H. Gams: Neue Beiträge zur Vegetations- und Klimageschichte der nord- und mitteleuropäischen Interglaziale,** [New contribution to the history of vegetation and climate during North and Central European interglacial periods], p. 80–81

American Meteorological Society, Bulletin, Vol. 36, No. 8, Oct. 1955

Landers, Holbrook: **Analysis of some "project jet stream" data,** p. 371–378

Bates, Ferdinand C.: **Technique for predicting extreme turbulence related to thunderstorms,** p. 379–383

Kassander, A. Richard, Jr. and Stewart, Robert M., Jr.: **Simple low-inertia anemometer of the three cup type,** p. 384–389

Porter, John M.; Means, L. L.; Hovde, J. E. and Chappell, W. B.: **Synoptic study on the formation of squall lines in the North Central United States,** p. 390–396

Wilkins, Eugene M.: **Discontinuity surface produced by topographic winds over the upper Snake River Plain, Idaho,** p. 397–408

Roth, Richard J.: **Crop-hail insurance actuarial association,** p. 409–411

Trans World Airlines, Inc.: **History of TWA Meteorological Department,** p. 411–415

Bigelow, Julian and Gilchrist, Bruce: **Data transmission for numerical weather prediction,** p. 417–418

Brooke, E. M. and Nuttli, Otto I.: [**Review of**]: **Advances in Geophysics, ed. by H. Landsberg, Vol. 2, 1955,** p. 419

Zoch, Richmond T.: [**Review of**] **Karl Schneider-Carius: Wetterkunde, Wetterforschung (Meteorology, weather forecasting),** p. 419–420

Weather Bureau veteran awarded honorary degree, p. 420

Electronic aid to weather research, p. 420–421

Solar energy [from the Ford Foundation Report 1954, p. 62], p. 421

A. J. Connor, M.A. [Obituary], p. 421

Annalen der Meteorologie, Hamburg, Vol. 6, No. 11/12, 1953/1954

Kruhl, Heinrich: **Trog, umgebogene Okklusion, sekundäre Kaltfront, 1. Teil,** [Trough, bent-back occlusion, secondary cold front, pt. 1], p. 321–341

Müller-Annen, Hans: **Zonal-Index, Luftdruck der Nordhalbkugel und die Witterung in Nordwestdeutschland. Untersuchungen, Gedanken und Methoden zur Langfristvorhersage 9 Beitrag,** [Zonal index, pressure of the Northern Hemisphere and weather in North-West Germany. No. 9 of Investigations, ideas and methods in long-range forecasting], p. 342–356.

Fleischer, Richard: **Der Jahresgang der Strahlungsbilanz und ihrer Komponenten,** [The annual variation of the radiation balance and its components], p. 357–364

Rodewald, Martin: **Studien über klimatische Schwankungen. Ein Referat mit Anmerkungen,** [Studies on climatic variations. Review with remarks], p. 365–379

Bolle, Hans-Jürgen and Fleischer, Richard: **Der Einfluss der Lupolen-Absorption auf die Messung und Registrierung der Ultrarot-Strahlungsströme,** [The influence of lupolen absorption on the measurement and recording of infrared radiation flux], p. 380–381

Australian Meteorological Magazine, Melbourne, No. 9, June 1955

Gaffney, D.: **Aspects of summer troughs in Western Australia,** p. 1–13

Maher, J. V.: **Development of secondary cyclones in the area from the Eastern Bight to Tasmania,** p. 14–31

Hannay, A. K.: **On the movement of tropical cyclones, 1954/1955 season,** p. 32–43

Garriock, A.: **Case of clear air turbulence at medium altitudes,** p. 44–54

Maher, J. V.: **Preliminary report on an objective method of forecasting minimum conditions at Leigh Creek, South Australia,** p. 55–60

Vollprecht, R.: **Dwelling up storm,** June 1954, p. 61–66

Vollprecht, R.: **Stranger than fiction,** p. 69–70

Ciel et Terre, Brussels, Vol. 71, No. 7/8, July/Aug. 1955

Malet, L.: **Eléments de météorologie, Chapitre III, Mesures en altitude,** [Elements of meteorology, Ch. 3, Upper air measurements], p. 223–254

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